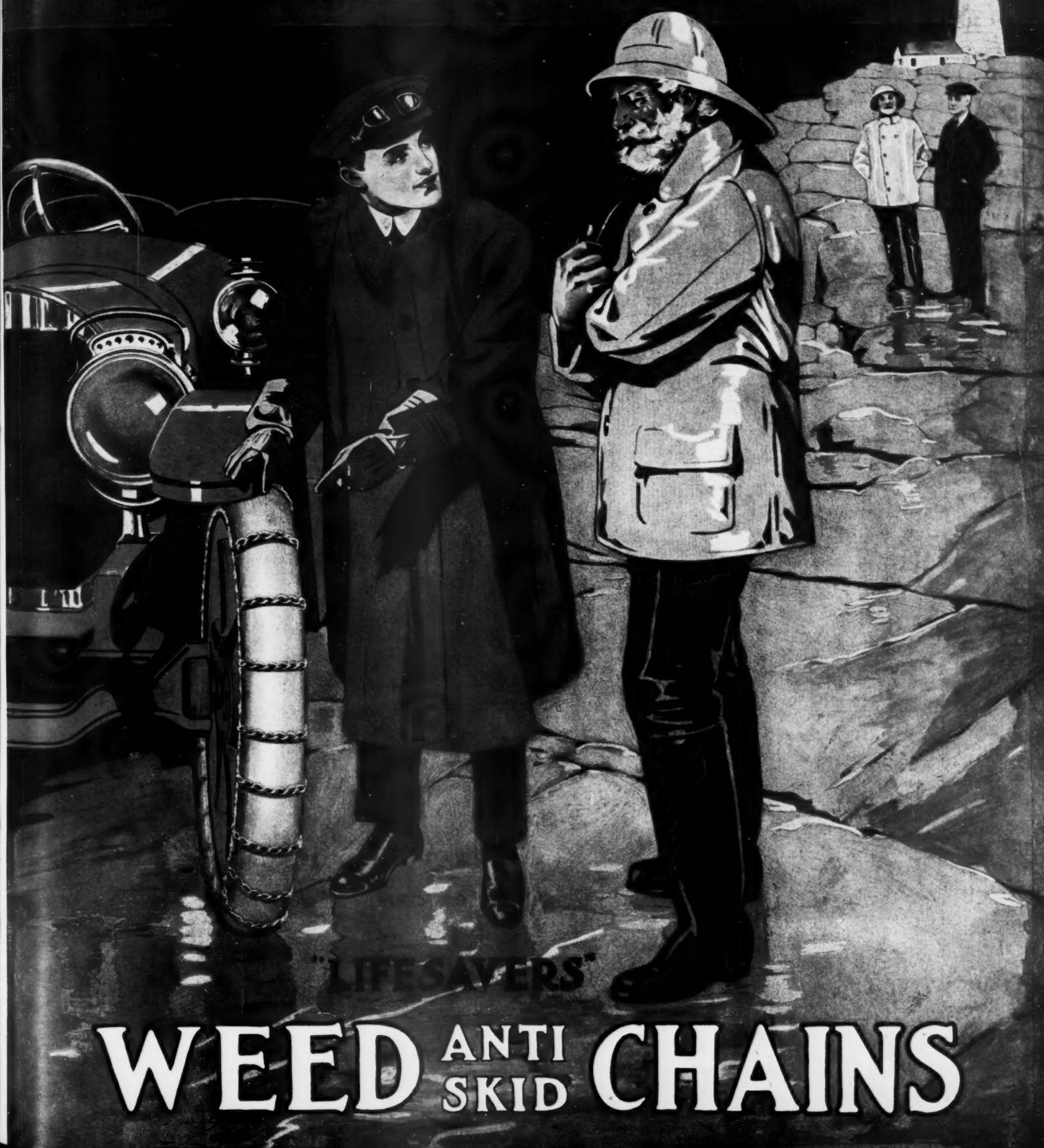


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MOTOR AGE



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Speaking of Trials—

of tests—in the tests to which engineers subject ball bearings they find it almost impossible to break down a Gurney Bearing. Why is this? Why does a ball or a raceway in a Gurney Bearing stand up better than in any other ball bearing? It is due more than to any other single cause to the greater closeness and exactness of our RACE CONTOUR. Granting, for the sake of the argument, that in other respects other bearings are as good as ours, the difference in the contour of our raceways alone would ensure for our bearings greater capacity and endurance.

¶ When a load is imposed upon a ball bearing the steel of both balls and raceways yields and the area of contact between ball and raceway increases. As the area of contact increases the resistance to further distortion increases, and so the supporting capacity is increased. Under load the steel yields until with the increasing contacting or supporting surfaces the resistance to further distortion equals the load.

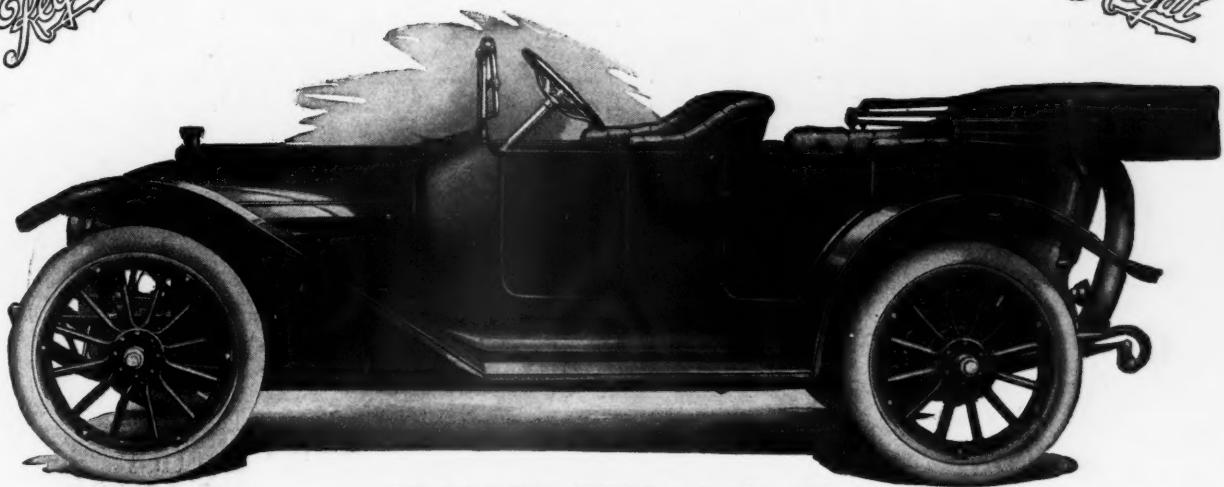
¶ Now, the closer the race contour is to ball contour the less yield or springing of the steel is required to get a given area of contact and support. When a ball is running in a raceway of 4% greater contour the steel is distorted less than when the contour is 7% or 10% greater.

¶ This, then, is the simple explanation for the much greater capacity and endurance of the Gurney Bearings. With our 4% raceways a given load distorts the steel of both balls and raceways less than in any other bearings made. CLOSER RACE CONTOUR, LESS DISTORTION, GREATER CAPACITY, AND LONGER LIFE. That is the race contour argument in a nutshell.

GURNEY BALL BEARING COMPANY
Jamestown, N. Y.

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Model "T"—\$1125 f. o. b. Detroit

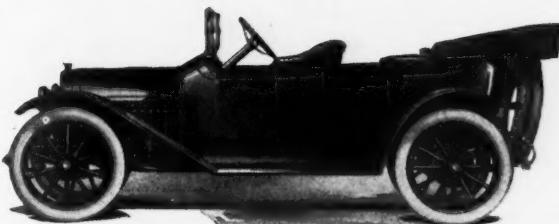
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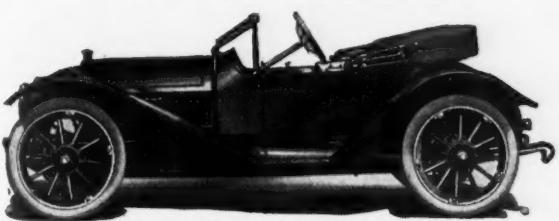
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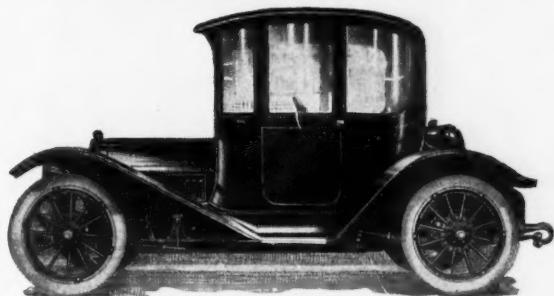
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Model "C"
Overhung Five Passenger Touring Car—\$1350.00 F. O. B. Detroit
Wheel base, 116 inches. Motor, four cylinder cast en bloc; bore, 4 inches; stroke, 5 inches. Dual ignition. Cooling, thermo-syphon with fan. Selective sliding gear transmission, three speeds forward and reverse. Cone clutch with leather face. Steering, left hand, center control. Tires, 34x4 inches. Demountable rims.



Model "N"—\$1125.00 F. O. B. Detroit



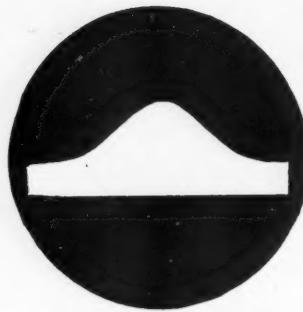
Model "NC"—\$1600.00 F. O. B. Detroit

SPECIFICATIONS "T"- "N"- "NC"
Motor, four cylinder cast en bloc; bore, 3½ inches, stroke, 4½ inches. Dual ignition. Cooling, thermo-syphon with fan. Selective type sliding gear transmission. Leather faced cone clutch. Steering left hand with center control. Demountable rims.

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MOTOR AGE



In the Land of Pueblo and Cliff Dweller Where Nature Has Made Rocks Her Canvases

EDITOR'S NOTE—This, the third article of the touring serial story, "In the Land of Pueblo and Cliff Dweller," treats of the scenic wonders of the Grand Canyon, petrified forests and painted desert of Arizona, and takes the reader into the roving ground of the Navajo. Two other articles have preceded this, one dealing with the Indian pueblo at Taos and Santa Fe and the other with the ruined homes of the prehistoric cliff-dwellers. This trip was made last fall by J. P. Dods, of the Automobile Blue Book, who accompanied the expedition sent out by the White Co., headed by J. A. Harris, its advertising manager. The photographs were taken by Lazarnick, of New York.

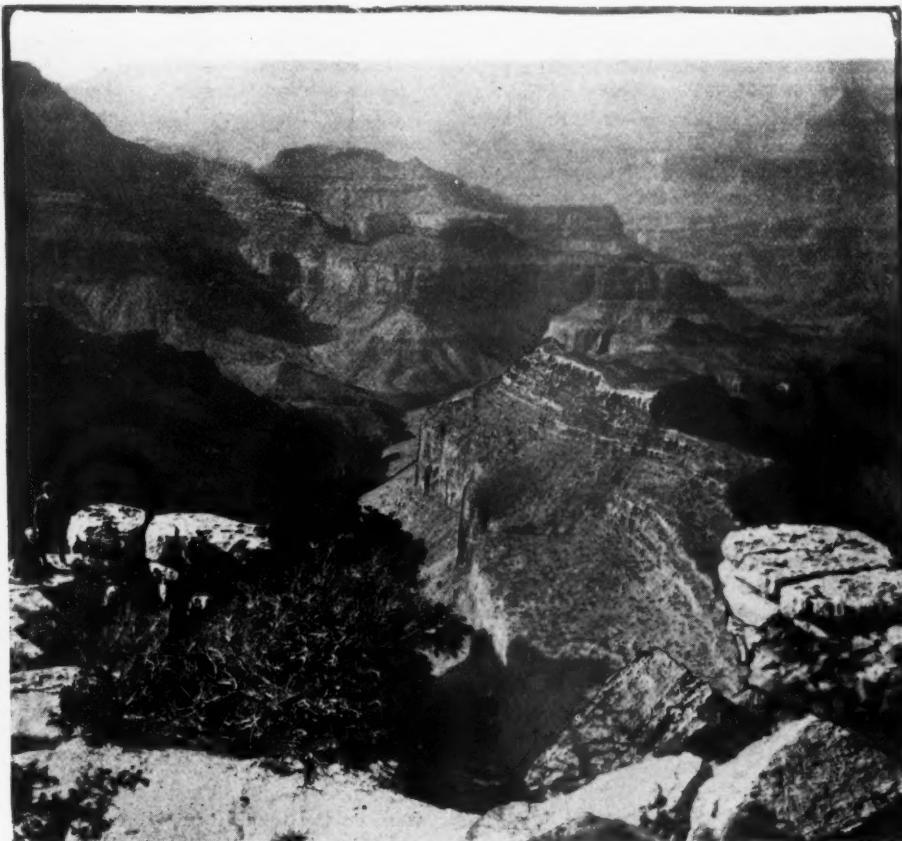
By John P. Dods

IRIS, goddess of the rainbow and its seven inimitable hues, attend! And you, O muse! of the nine muses specially delegated to inspire lowly mortals and circus press agents with the gift of penning superlatives, you also may consider yourself properly invoked.

For I, pygmy man, must write of colors that even a Michael Angelo could not duplicate on his immortal canvas and must describe the indescribable. I must tell of the petrified forests, of the painted desert,

of the Grand Canyon of the sinuous Colorado—three natural wonders of the Arizona wonderland—over which we gasped and gulped in wordless appreciation on our motor tour through America's southwest.

The chronicler of such an expedition is no person to be envied. This is not an original deduction. A certain Spanish conquistador first voiced such an opinion back in 1540 and set it down on parchment for regal eyes to read. My present predicament is not unlike that of the police court



The Grand Canyon, the Titan of all chasms, from Grand View Point

reporter who was assigned to write a description of the gowns worn at the charity ball for a Chicago newspaper. He found that it was one thing to admire the polychromatic creations of a French modiste and another thing to describe them.

Color Press No Remedy

"Say!" he shrieked in desperation as he handed his copy to the city editor, "you'll have to run that stuff on the three-color press if you get any punch in it," and rushed out of the editorial rooms to buy three fingers of color-blindness cure at a nearby shrine of Bacchus.

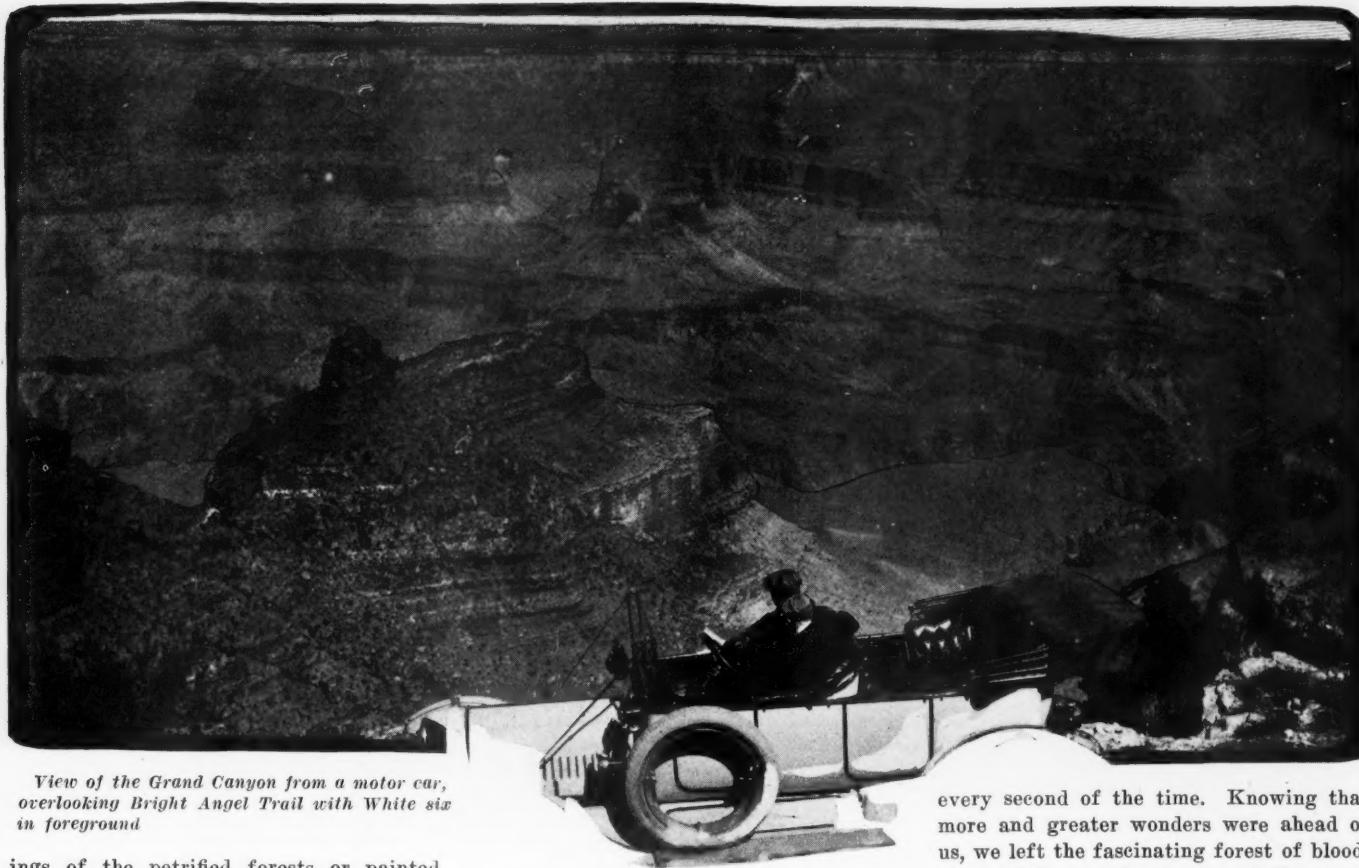
No, on sober second thought, I take that all back. My predicament is thirteen thousand times worse. There isn't a three-color press in the world that could register the countless hues of that Titan of chasms, the Grand Canyon, or the brilliant color-

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View of the Grand Canyon from a motor car, overlooking Bright Angel Trail with White six in foreground

ings of the petrified forests or painted desert for that matter and moreover I am writing this in prohibition territory.

Forests of Colored Stone

If you never have experienced color intoxication, set out from Springerville, St. Johns or Concho and following the windings of the Little Colorado river, ride over the rolling, arid plain until 10 miles east of Holbrook. At that point you will enter a forest the like of which you never have seen before, a forest of recumbent petrified trees that is 2,000 acres in area and, as far as I know, without a single leaf. The ground is carpeted with agate chips and littered with the onyx trunks of dead sequoias that took from 6,000 to 10,000 years to reach their full growth; giant sequoias that budded in the eternal sunlight long before prehistoric man worshipped its rays only to be prostrated centuries ago by the sweeping waters of a mighty inland sea. Some are so deeply rooted in the sandy soil that only their topmost branches are visible. One huge trunk, forming a natural bridge of jasper and agate, spans a canyon 50 feet wide.

In the petrified forests, the stumps and logs of stone—some are over 200 feet in length with their ends buried in the sand—are so hard that they could be used to cut glass but this peculiar hardness is not the most striking feature. Hardness can be accounted for by the slow and tedious process of petrification. Who can explain how these chips and pillars and segments of trees hold captive the tints of the rainbow? The colorings are wonderful. Every hue and color combination is found here. In some of the cross-sections, cut as clean as if with a saw, black and white predominate with scattered specks of gold. Others have concentric circles of the wood grain in the varied shades of blue, purple, red, green and yellow.

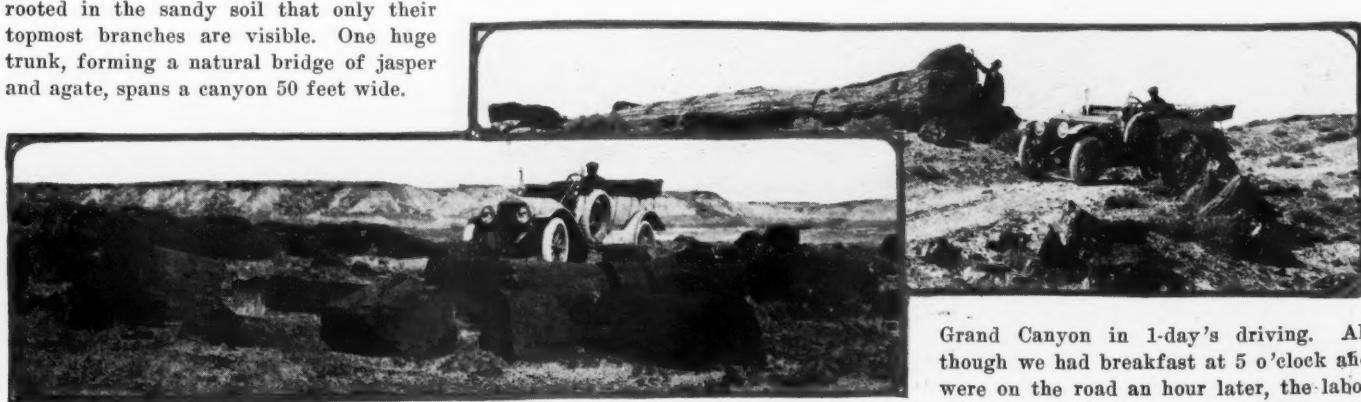
We spent only 3 hours in the petrified forests. We could have spent 3 weeks there and observed a new color, a new combination of colors, a new formation

every second of the time. Knowing that more and greater wonders were ahead of us, we left the fascinating forest of blood-red, bark-incrusted columns and the countless chips of countless hues and proceeded to Holbrook.

Bridge at Chevelon Creek

From Holbrook to Winslow, our night stop on the trip to the Grand Canyon, we found that some highway improvement had been completed. This was especially noted when we crossed Chevelon and Clear creeks where new steel bridges have been built recently. The former, in particular, was the finest piece of bridgework we had seen in the southwest. The rocky sides of Chevelon creek rise sheer and perpendicular for a distance of 200 feet above the water. The gorge is over 100 feet wide and, before the bridge was finished, absolutely impassable, necessitating a wide detour at this point.

Arriving at Winslow just before dusk, we determined to get a good night's rest and start at daylight in order to make the



Scenes in the petrified forest of Arizona

Grand Canyon in 1-day's driving. Although we had breakfast at 5 o'clock and were on the road an hour later, the labor of early rising gained us nothing as we went 10 miles off the route and were forced



Hubbell's ranch and its hospitable owner, Lorenzo Hubbell

to return to Winslow later in the morning for additional directions.

The first part of the journey from Winslow was nothing to enthuse over. We rode over the flattest country we encountered on our entire trip, although we were in constant sight of the snow-capped San Francisco peaks, straight ahead and to the west of us. Just beyond Tolchaco, where we found volcanic cinder roads of natural construction again, we started a gradual ascent of the rambling foothills and looking off to the north and west, had our first view of the painted desert.

The painted desert is almost the very opposite of the average man's conception of a desert. It is about as much like the Sahara as New York is like Kokomo. It qualifies as a desert geographically because it is arid

country. It resembles the Sahara in that it is romantic, mystic, picturesque. But it is neither flat nor sandy. It is a waste land of enormous buttes and mesas made up of innumerable strata of brightly colored rock and miraged in fantastic shapes against the clear heliotrope skies of the southwest.

From a distance, the painted desert is a colossal panorama, pinkish red in tint and imposing in its grandeur. On closer inspection, however, it is a chaos of color, far more entralling than the ever-entralling desert of common conception, the desert that lures prospector and adventurer into its arid maw to wither their skins, deaden their eyes and never release its captives. Red, in a thousand shades and combinations, predominates but on the crimson background Nature has splashed the blue of the ocean and sky, the green of the stagnant pool, the gray of the early morning mist. Sahara's sands are yellow and blinding. The soil of the painted

desert is a changing mass of tints and hues that appeal to the barbaric love of color that is in all of us.

Bedouins of the Painted Desert

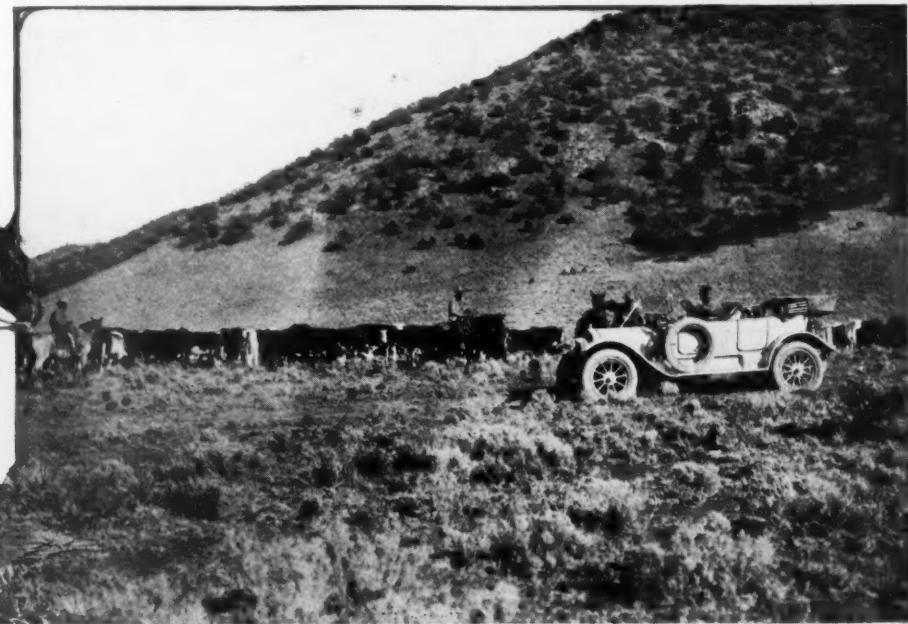
Like the vast Sahara, the painted desert has its Bedouins who ride, not on lumbering camels, but astride fleet ponies; America's Arabs who, wrapped in soft blankets of wonderful design and color and with



Navajo chief

red bandages about their heads, dart from behind the towering mesas to race across the waste lands to the jingling accompaniment of bells. They are the Navajos, master weavers and redskin gypsies.

We rode along the edge of the painted desert only for a short distance, then we passed between two enormous extinct volcanoes and entered the timber once more, driving along a pine-flanked road almost all the way into Flagstaff. The last 7 or 8 miles of the trip was over a regular boulevard, 30 feet in width and well-graded.



Cowboys bringing cattle into Flagstaff





Typical buttes in the painted desert of Arizona

Eighty-three miles north of Flagstaff is Grand Canyon. It is not a long drive. We covered the 70 miles to Grand View in 4 hours in the White six and reached the brink of the colossal chasm, 13 miles farther on, an hour later. The highway, mostly of cinder construction but in some places covered with volcanic rock that is being cleared away, is almost perfect. We drove the last 13 miles in the dark through a dense forest of pine and reached the rim of that gigantic gorge as a full moon bathed its innumerable cones and turrets in yellow light.

The Grand Canyon is the Grand Canyon. You can say no more in a thousand times that many words. You can pay reverence to it only in superlatives and they are woefully weak. It is the greatest wonder in the world, the greatest chasm in the world, it is the most impressive, the most superb, the most stupendous sight that the eyes of pygmy man are privileged to look upon.

Just Some Statistics

If you are a glutton for the hieroglyphics of the stock ticker tape or the baseball batting averages, perhaps the following statistics will interest you: The Grand Canyon is 217 miles long, from 13 to 20 miles wide and has a straight drop a mile deep, or 7 miles as the trail zigzags down. Don't yawn. You have read all this before? Well, erudite reader, do you know who John Wesley Powell is? You don't? Neither did I before I consulted the encyclopedia in my desire to learn the name of the explorer audacious enough to brave the unknown rapids of the Colorado and climb the tortuous peaks that geologic knowledge might be enriched and a world's wonder be accessible to tourists. And John Wesley Powell was the name I found. Don't talk to me of Stanley and darkest Africa. I prefer to laud a living explorer and the realm of color and magnificence that he refound less than half a century ago, an explorer for a wondering posterity whose fame is little known.

The Grand Canyon is the best place to gasp that I know of. When the Spanish conquistadores of 1540 first dug their steel sabatons in the soil at its brink they christened it the Inferno after they recovered their breath. The Indians, who called it the place of fire, worshipped it but only from afar. Powell alone was inquisitive. He, a mild-mannered geologist, dared a feat of exploration from which the war-

riors of Castile and the braves of the American plains shrunk. Rallying around him a small band of men as fearless as he—although three deserted before the trip down the Colorado was begun—he spent 15 months in this Inferno, this place of fire and explored a region as unknown in 1868 as the western hemisphere was in 1492.

Although motor cars are barred from the trails of the Grand Canyon, we obtained an excellent view of this mighty chasm at Grand Point View. Had time not been so pressing, we would have liked to drive by wagon over the recently completed Hermit Rim road, a modern macadam boulevard 9 miles in length that skirts the edge of the colossal gorge and gives the tourist perhaps the best opportunity to inspect the wonders of this greatest of scenic wonders. There is no doubt about the justness of the ruling against motor cars at Grand Canyon as long as horses are on the road, but it is very probable that such orders will be rescinded within a year or two when half of the tourists will travel to Grand Canyon by self-propelled vehicles.



Upper illustration—Scene on route between Flagstaff and Grand Canyon

Lower illustration—Black butte of volcanic rock near Indian Wells

1—Navajo shepherdess

2—Navajo and papoose



3—Old Navajo woman

4—A Navajo beauty



After leaving Grand Canyon, our next objective points, according to our advance schedule, were the Hopi villages, especially Oraibi and Walpi, in the very heart of the painted desert and famous throughout the world for the snake dances. Coming westward we made constant inquiries concerning the route from Flagstaff to Keam's Canyon, the trading post for Oraibi, but were unable to find anyone who had made the trip. Although we were sure that there was a road from Tolchaco, we did not dare to start across the isolated country under the circumstances.

Abandon Trip to Oraibi

Because there was no guide available and since we could obtain no road data, we were forced to double back as far as Holbrook, a journey that consumed 1 day of valuable time, and from there went to Granada.

Leaving Holbrook in the morning, we found a surprisingly good road as far as Indian Wells. In the vicinity of this village we had the worst experience of our entire trip, an experience that taught us the folly of taking foolish chances in touring through the southwest.

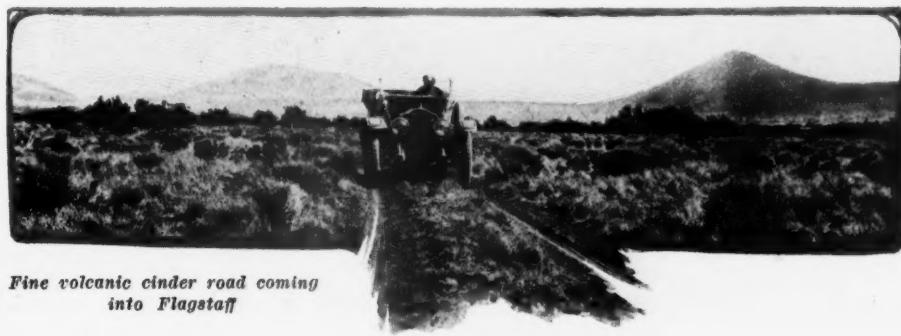
Instead of going to the head of the Cottonwood Wash, we tried to cross it about 8 miles south of Indian Wells, where the banks are very steep and the

bottom most deceiving, appearing to be hard and dry, but far too soft for traction. We found on putting the car into it that the banks were even steeper than we had appreciated—so much so that we had to ease the car in the bottom very carefully. When we came to throw on power, the back wheels, as soon as they hit the bottom, sank in until the differential housing was half-buried and we thought we would surely lose the tool box on the back, as the gyrometer indicated that the car was resting at an angle of

34 degrees with the box bearing a great deal of the pressure. We were able, however, to relieve this somewhat and then we got to work trying to find a way out. We had 100 feet of rope with blocks and after a number of trials were able to get a "dead man" sunk in the ground sufficiently deep to hold. On attempting to start the car, however, we found we could not budge it a fraction of an inch, largely because the axle was not quite on a level with the ground and therefore in pulling on the tackle, which was parallel to the ground, we were exerting more of the force on the wheels against the incline than we were extending to pull the machine upward.

Finally we had to get down under the car and with the assistance of a Navajo dig out the heavy, dry mud. We reduced the angle of the car by digging a big section of the bank out in front and lowered the front wheels about 18 inches. We were first held up in this predicament at noon and at dark we were in very little better shape than when we started except for one thing—we found the Indian teams could not budge the car and ended up by breaking our tackle.

We were stranded, without anything to eat and with nothing except a sandwich since leaving Winslow early in the



Fine volcanic cinder road coming into Flagstaff

morning; with no blankets, although fortunately we had water. The nearest white man was eight miles at Indian Wells. It seemed advisable to get there the first thing and secure help.

With this end in view, I started out on horseback, with a little Navajo boy as guide, to reach Indian Wells. As it was my first experience on horseback, the beauties of a moonlight ride across the painted desert were not fully appreciated, although for the first few miles things went very well. After that I began to feel sharp, shooting pains in my knees and ankles where I had been doing my best to hold some of the weight in the stirrups. On reaching Indian Wells, which was nothing but a trading post and Indian hospital, I found that every available horse had gone over to the Navajo dance about 15 miles distant.

Night on the Painted Desert

This meant that there was no help to be had, as the storekeeper's partner was away and he could not leave the place alone. He was good enough to give us some blankets and supplies and with these I started back to the Cottonwood. I soon found that the half-hour rest had so stiffened me that riding was torture and rather than go through it, I walked the 8 miles back. That return is a sort of nightmare to me, although under favorable conditions I suppose it really is a wonderful sight to walk across the painted desert by moonlight, as we found out later. Getting back to the wash I found my companions had constructed a sort of an inclosed hood, with the use of the top and every available coat and sweater, over the back of the seat. They seemed to be asleep and I was too tired even to investigate, so pulled the blankets off the pony, spread them out on the ground and rolled up as best I could.

At daylight we all felt fairly refreshed, but the problem of getting the car out still confronted us and with no hope of obtaining any assistance from Indian Wells before noon at the earliest, we set to work to liberate ourselves. Before attempting to do any more pulling with teams, we

spent nearly 2 hours jacking up the back wheels, a little at a time and holding the ground gained by wedging in dry dirt, sticks and brush. In the end we had the car resting on a grade of about 12 per cent and on hitching on three teams and making use of our own power we finally got started and had the wheels on good solid ground, where it was no trick at all to pull out. It was 12:30 o'clock before we were on our way for Indian Wells, and 2 hours later we started for Granada.

At Indian Wells we made the mistake, for a second time, of not heading for Keam's Canyon but lack of reliable information and the fact that we were behind in our schedule resulted in us going straight to Granada from which point we planned to reach Canyon de Chelly, a gorge that rivals the Grand Canyon in beauty.

The road across the Navajo reservation to Granada was over an even more rugged country than we had traveled heretofore. We were in the grazing ground of the red-skin shepherds who, unlike the Pueblo or Hopi, have no permanent villages or individual homes. The Navajos are a nomad people. They move about most of the time in order that their sheep, almost the sole source of their income, may have good feeding grounds and water. They are the most prosperous of all the North American Indian tribes, refuting the adage that "a rolling stone gathers no moss."

Navajo Woman a Drudge

At the present time the Navajo tribe numbers between 24,000 and 27,000 members, with an average of twenty-five to thirty sheep per person. Like the Indians of the other nations, the man is the drone, doing practically no work except to assist in tending the flocks. The squaw, with the assistance of her children, shears and cleans the wool and weaves the blankets for which the tribe is nationally famous. The blanket-making is done almost entirely out of doors on a simple loom that can be packed and carried on the various migrations.

Although a drudge, the Navajo woman is a per-

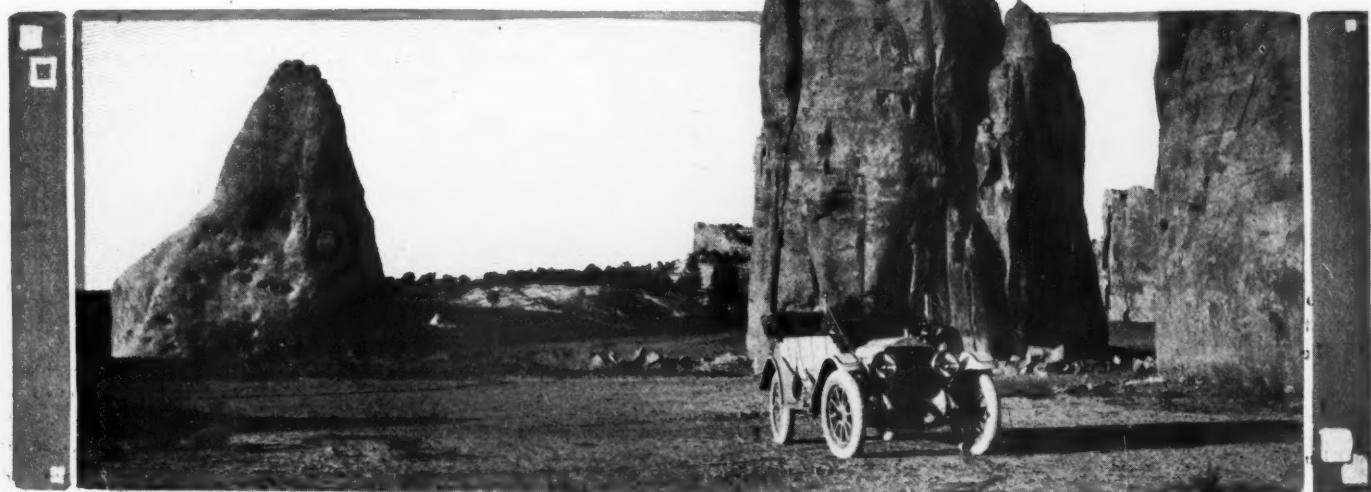
son of power in the family, a sort of militant suffragette. She is the property-holder and head of the household. Should she become dissatisfied with her husband, she leaves his saddle outside of the hogan door and a divorce has been effected outside the courts and with no list of correspondents published. The Navajo brave, however, has several wives, as many as he can take care of in fact, so that the loss of one is not considered a great hardship. More feared than the wives are the mothers-in-law, at whose approach the timorous husband goes into hiding.

Skilled Weavers and Silversmiths

The Navajos are skilled in two arts, that of weaving, which they learned from the Pueblos, and that of working in silver, taught by the Spaniards and Mexicans. Today some of the Navajos are the most experienced silversmiths, hammering out of silver coins or bullion many varieties of jewelry and spoons, the latter very often without any heating whatever. In both design and execution, their work compares favorably with that procurable at the craftsman shops in the east. The main source of revenue of the tribe, however, is from the sale of wool, live sheep and the blankets.

We pulled up at Hubbell's store at Granada about 7:30 o'clock. Although Mr. Hubbell knew we were coming and we had heard about his splendid hospitality, we could not help but feel how presuming it seemed to drive up to a man's house just at meal time with the next habitation 25 miles away. Here we were—three absolute strangers; furthermore, we were not even westerners, but liable to be classed among those easterners who are quite apt to presume upon the hospitality offered by such people as Mr. Hubbell. We had hardly jumped out of the car when we received an invitation from one of the clerks in the store to pile our stuff in the office.

Mr. Hubbell came out from dinner and although the table had already had two runs, he immediately led us into the house and saw that we were well fed. As usual, the house was full; in



Stone haystacks between Saint Michaels and Gallup

fact, we learned later that Mr. Hubbell himself was giving up his bed to a stranger.

To give a proper description of Mr. Hubbell's store and house one must spend weeks becoming acquainted not only with the man himself, but the hundreds of paintings, pictures, drawings and Indian relics of all kinds which he has in both his office and the big hall of the house. The work of every prominent artist of the southwest is represented there and his collection of Burbank Indian heads is remarkable; in all there are nearly 300. In addition to these is a wonderful collection of hand-colored drawings, although they seem more like oils, of every type of Moqui and Navajo blankets. The floors of both the office and house are covered with rare old relics. Here we saw finer Bayettes than on any of the rest of our trip put together.

In the morning we were much surprised to find that in general appearance both the store and house had the low, squatly aspect of the typical adobe dwelling. It is true the house had great evidence of American type of architecture in that it had a porch clear across the front and a high, flat roof running clear back of the placito. This represented the height of the living room or big hall which is used as dining room and living room combined. With the exception of room for doors, opening into the various sleeping apartments, the walls are covered with a wonderful collection of paintings. The ceiling, between the enormous beams, is strewn with a priceless collection of Indian basket work.

"King of Northern Arizona"

Mr. Hubbell himself is known as the king of northern Arizona. In addition to being a lover of art as well as a painter he is the shrewdest trader and politician in the whole state. For years he has led the republican party, although dwelling 60 miles from the railroad with the nearest white man 25 miles. As to his relation with the Indians themselves he is best compared with the chief trappers of the Hudson Bay Co. What these were to the Indians of the north, Lorenzo Hubbell has been to the Navajo of the desert.

We learned from Mr. Hubbell for the first time about our great mistake of not coming across from Tolchaco to Keam's Canyon. He told us he had personally made the trip during the summer and found it an excellent road; furthermore, he said we were missing the greatest sight in the southwest by not taking in the Moqui villages. To make things still worse, we were informed that our chances of making a successful trip to Canyon de Chelly and getting into the canyon were very slim; in fact, everyone in Granada that had had any experience on such a journey said with our big car we would never make it.

After spending a day at Granada and a second night, we finally decided to go on to Gallup, making a side trip to the pueblo at Zuni, and then determine about the possibility of returning clear to Keam's Can-

you. Mr. Hubbell, who operates a daily motor mail route between St. Michels, Granada and Keams, reported the roads in very good shape except for the cross-washes.

We found the road to Gallup very good. Here we were met by C. N. Cotton, the largest wholesale dealer in Indian traders' supplies in the southwest. We again learned from Mr. Cotton's son of our mistake in not coming direct from Keam's

Canyon to Tolchaco, as Jack Cotton had made the trip himself during the past few months. From him we had our first encouragement about the prospects of getting into Canyon de Chelly, and although he admitted the trip dangerous on account of the quicksand and heavy flat sand, he thought we could make it. Furthermore, he was willing to go along with us as guide and make the attempt.

(To be continued.)

Motorists Reach Grand Canyon's Rim

Feasibility of New Route Demonstrated

SALT LAKE, Utah, Dec. 13—For years Salt Lake motorists have dreamed of reaching the north rim of the Grand Canyon of the Colorado in a motor car. It has been talked and discussed, but it was generally believed there were too many insurmountable objects for the modern motor car to overcome. It was known the best view of the Grand Canyon was to be had from the north rim. Here the canyon was deeper and the rim higher with an unobstructed view of nearly 100 miles up and down the canyon. Artists had made the canyon world famous with views taken from the north side, which was beyond the reach of the average person unless a hazardous 4-day trip by mule and on foot was made down through the canyon, and up the opposite side from El Tavor, the railroad point on the south side of the canyon.

To find whether it was possible to reach the canyon in a motor car and investigate the feasibility of a motor route, the Salt Lake Tribune organized a party under the direction of W. D. Rishel, its motor editor and secretary of the Automobile Club of Utah. The trip has just been completed. Eight cars carrying nineteen men and three women made the round trip in 14 days. These cars were pushed to the north rim of the canyon where the headlights of the cars flashed on El Tavor, 13 miles across the canyon. Side trips were made to Greenland, Head of Trail and Bright Angels Point. The latter point is the highest point of view of the entire length of the Grand Canyon. The river itself is 6,200 feet below, practically a straight drop down. El Tavor, on the Arizona side, is 1,000 feet lower and the hotel and railroad is plainly visible from this point of vantage.

The most surprising part of the trip was the nature of the country on the north rim of the canyon. It had been supposed by the writer as well as many others that the country from the south line of Utah to the canyon was of a desert nature, sandy and impassable for a motor car. Imagine the surprise of the members of the party when it entered the Kaibab forest, and for 60 miles to the very rim of the canyon itself they found themselves in one of the largest virgin forests in America. Pine trees from 2 feet to 6 feet in diameter disputed the right of way for the entire distance.

Through this forest there is no semblance of a road. The ears travelled eight abreast over the pine-needle surface, not unlike a heavy velvet carpet. High gear was possible for the entire distance, and the only obstacles met were occasional dead trees which caused one to turn to the right or left to avoid them. Hundreds of deer were flushed by the cars, their first view of a motor car and in many cases the first view of a deer in its wild and natural state by members of the party.

Forest Supervisor James L. Pelton of Kanab, Utah was notified by headquarters that \$2,800 had been appropriated to blaze a trail through this forest for a motor road. It will not be necessary to build a single bridge, or turn a shovelful of dirt in the entire distance. His foresters will be put to work to remove dead timber here and there and mark the route. This will have to be done with tin signs nailed to trees. The old system of blazing a tree with an axe will not do for motor travel because a car goes too fast for the driver to locate the blaze marks, hard to distinguish from scratches on trees due to other causes.

The worst part of the road was found to be from Kanab to Panguitch, Utah. Here the state has designated a state highway, but it is necessary to practically rebuild the entire 75 miles before it will become a feasible motor road. This it is expected will be done during the coming winter, to have the route opened by next summer.

By opening the route from Salt Lake to the Grand Canyon, it will give tourists their only route to the Grand Canyon from the north. It will take hundreds of thousands of dollars to build a road across the canyon itself that will be passable for a motor car. At present, it is impassable for even a light buggy as there is nothing more than a mule trail across the canyon. However, a motor road is bound to come some day. This route to the canyon places Salt Lake City just midway between the Yellowstone park and the Grand Canyon. This will greatly strengthen Salt Lake City's position as a western touring center as these two points are sure to be the mecca of western touring travel.

Motorists Try to Outguess Father Time

Results of Coast Secret Control Reliability

SAN DIEGO, Cal., Dec. 12.—With a total mileage of 210 miles, which included some of the stiffest mountain work in California, the first annual tour of the Motor Car Dealers' Association of Los Angeles ended here this afternoon. Motor experts declare that the tour was one of the most remarkable ever held because not the slightest mechanical difficulty was experienced on the entire trip and the cars came amazingly close to the secret schedule.

Time was the determining factor in this tour, there having been scattered along the roads secret checkers to catch the time of each contesting car as it passed. With all the cars giving perfect mechanical service, the tour became a contest of consistency on the part of the drivers.

When the final figures were checked up here at the finish it was found that Earl Y. Boothe in his National was the winner, having been penalized only 2 points in the entire trip. These two were lost in the first control out of Los Angeles, Boothe having driven 2 minutes too fast to a secret checking station. After that his judgment was perfect.

There was a leeway of 1 minute at the various checking points. On the first day's run the total penalties amounted to 130 points. Every driver but one did better on the second day's run, the total penalties being cut to 37. The drivers the most heavily penalized the first day, A. S. Robinson and Leon T. Shettler, made perfect scores today in the run from Riverside.

The driver to win second honors of the tour was J. F. Scott in a Paige, who was penalized only 3 points. His driving today was perfect. L. V. Starr in an Overland and F. M. Headlee in a Chalmers were tied for third place with 5 points each. P. A. Lord, driving a Maxwell, was next with 12 points against him. Eleven of these came the first day.

The first day's run was from Los Angeles to Riverside, a boulevard jaunt. But today's schedule took the cars over the Box Springs, the first Pala and numerous short grades into Escondido, where a stop was made for lunch. The run into San Diego was over the Poway grade. Practically the entire run was over mountainous and rolling country where every road condition was met and grades as steep as 20 per cent found.

The cars stopped at Perris, Elsinore, Temecula and Escondido, where the townspeople flocked to the principal streets where the cars were parked in exhibition array. It was estimated tonight that since leaving Los Angeles that the cars had been viewed by 75,000 persons. The tour was the suggestion of J. H. McDuffee, who acted as chairman of the committee and

drove the Stearns-Knight as the official car in the enjoyable tour. Summary:

No.	Car	Driver	First day Penalties	Second day Penalties	Total Penalties
7	National	Earl Y. Boothe	2	0	2
10	Paige	J. F. Scott	3	0	3
11	Overland	L. V. Starr	5	0	5
12	Chalmers	F. M. Headlee	5	0	5
16	Maxwell	P. A. Lord	11	1	12
17	Mitchell	P. H. Greer	11	4	15
6	Oldsmobile	H. D. Ryus	13	3	16
3	Premier	E. W. Kelly	11	6	17
9	Kisselkar	A. S. Robinson	18	0	18
5	Apperson	L. T. Shettler	19	0	19
1	Lozier	W. D. Burke	6	15	21
2	Buick	Harry Coger	26	8	34

DENVER QUILTS THE A. A. A.

Denver, Colo., Dec. 11.—A move to form a western association is being started by the Denver Motor Club, which has adopted a resolution to withdraw from the American Automobile Association. The club claims that neither itself nor the state of Colorado has received from its affiliation with the A. A. A. sufficient benefits to justify its longer paying dues into the treasury of the national organization. That the national body is officered and controlled by eastern people, whose interests do not reach far enough west to gain for Colorado deserved consideration, is one of the reasons set forth for the withdrawal. Another is that the Denver Motor Club received no official notice of a recent visit of an A. A. A. field representative, who was reported to have come here to study important needs and developments of Colorado highways, and to have conferred with the Denver chamber of commerce instead

of with the motor club, which considered itself the official branch of the A. A. A. for this section and claims general recognition as the strongest and most active good roads organization in the state.

The club declares that dissatisfaction with the workings of the A. A. A. has existed for some time, and that this dissatisfaction is not confined to Colorado. Letters are being sent out to clubs throughout the states west of the Mississippi river, urging that a convention be called at an early date to organize the proposed new association.

CHICAGO NEW LIGHT BILL

Chicago, Dec. 15.—The campaign of city officials against glaring headlights, in which the motorists of Chicago co-operated probably will culminate in the passage of an ordinance, now in the hands of the judiciary committee of the city council, which was drafted by the Associated Roads Organizations and representatives of the city council and corporation counsel's office. The ordinance provides for the establishment of a board of motor vehicle headlight inspection which will have an office in the city hall and ascertain whether any lamps brought before it for inspection are too dazzling. Tags will be issued to makes passing the inspection so users will not be molested by the police.

TESTING ST. LOUIS SPEED LAW

St. Louis, Mo., Dec. 13.—Local motor clubs and associations are on the war path in an effort to secure saner laws for St. Louis. The signal objection to the present speed law is it prescribes a speed of 8 miles on hour, ridiculous for the outlying districts. The motorists favor the state law which permits a speed of 25

Ford's Report Shows Immense Balance

Company's Surplus Is \$28,124,173.86

DETROIT, Mich., Dec. 15.—The balance sheet of the Ford Motor Co. as of September 30, 1913, has just been made public and shows a surplus of \$28,124,173.68. The assets are shown to total \$35,033,919.86, of which \$13,225,710.82 is in cash. The merchandise inventories \$9,046,171.68, while buildings and building fixtures amount to \$4,615,156.82 and machinery \$2,305,962.09. Patents owned by the Ford company represent a total value of \$57,224.27.

The company has outstanding current accounts of only about \$3,000,000 and its entire liability exclusive of the surplus amounts to about \$7,600,000. Thus the surplus would cover this four times over. The Ford company's capital stock is \$2,000,000. The complete statement as issued by James Couzens, treasurer, follows:

ASSETS
Cash on hand and in banks..... \$13,225,710.82
Michigan municipal tax exempt bonds at cost..... 1,283,943.50

Accounts receivable	448,233.93
Merchandise inventory at cost	9,046,171.68
Other investments	7,433.32
Prepaid expenses	215,259.29
Real estate	1,540,483.42
Buildings and building fixtures	4,615,156.82
Factory equipment	676,589.49
Office furniture and fixtures	77,387.60
Power plant	528,945.24
Machinery	2,305,962.09
Tools	824,901.04
Patterns	92,710.13
Machinery, tools and equipment at branches	89,837.13
Patents	57,224.27
	\$35,033,919.86

LIABILITIES

Accounts payable	\$ 3,049,586.86
Accrued pay rolls	191,940.70
Accrued salaries	24,169.30
Accrued expenses	266,119.80
Contract rebates	25,960.00
Reserve for employees' bonus	134,999.96
Reserve for bad debts	3,510.55
Reserve for depreciation of fixed assets	1,061,805.25
Reserve for depreciation of patents	57,224.63
Reserve for fire insurance premiums	34,059.63
Reserve for unearned profits (branches)	60,370.23
Capital stock	2,000,000.00
	\$35,033,919.86
Surplus	28,124,173.68

miles an hour, but does not fix it, leaving the question open with the stipulation that the car shall be driven in a careful and prudent manner. A test case will be tried next week when a driver who was arrested for speeding last week is arraigned in the court of criminal correction, the defendant having taken an appeal after being fined in police court. The attorney for the St. Louis Automobile Club, who will defend the driver, said he would urge a dismissal on the ground that the city law was invalid. The contention of the unconstitutionality of the law is based on the allegation that the St. Louis ordinance conflicts with the state statute and that it is unreasonable in that it applied to motor cars only.

ISLE OF MAN RACE CERTAIN

London, Dec. 1—The United Kingdom is assured of a road race next year, for, whereas the Royal Automobile Club stipulated that unless twenty entries were received for its speed contest over the difficult Isle of Man course—which includes the ascent and descent of the Snaefell mountain road in every circuit—it might cancel the event, a total of twenty-three cars appeared on the list at noon today, when the time expired for receiving nominations at ordinary fees.

Entries still can be made at double fees, that is to say \$1,000 per car, up to March 31, 1914. The race is a 2-day affair and will take place on June 9 and 11. The engine capacity must not exceed 3,310 cubic centimeters and the minimum weight is to be 21½ cwt. as already arranged; but it recently has been decided that competitors will not have to take aboard sufficient gasoline to last them for the whole sixteen laps, or 600 miles, half of which will be covered each day. They may fit what sized tank they choose and fill up as often as they like, so long as replenishments are taken at the one official depot on the course.

The contest will be of an international character, but the home industry will have by far the best representation, the British cars entered being three Humbers, three Sunbeams, three Vauxhalls, two Straker-Squires and two Stars. Belgium will send three Minervas and three Pipes, Germany three Adlers, and Switzerland one Martini.

BISONS RE-ELECT M. W. WALL

Buffalo, N. Y., Dec. 16—Maurice M. Wall was reelected president of the Automobile Club of Buffalo at the annual election held here yesterday afternoon. Other officers chosen include: Vice-president, James H. McNulty; treasurer, Arthur W. Kreinheder; secretary, Dai H. Lewis; board of directors, Charles Clifton, George C. Diehl, Jr., J. A. Cramer, Harry Thorp Vars, Henry R. Ford, Oliver Cabanda, Jr., and E. D. Horgan. The present membership of the local organization is 3,389, making Buffalo one of the leaders.

Exports and Imports for October, 1913

Government Issues Interesting Report

WASHINGTON, D. C., Dec. 15—Figures made public today by the bureau of statistics show that 1,697 pleasure cars, valued at \$1,658,716, and seventy-nine commercial cars, valued at \$129,506, were exported in October last. The exports for the corresponding month of last year were 1,530 pleasure cars, valued at \$1,464,934, and eighty-two commercial cars, valued at \$118,878. The shipments of cars during the 10 months ended October, 1913, were 21,872 pleasure cars, valued at \$21,609,434 and 857 commercial cars, valued at \$1,480,-

646. The combined exports pleasure and commercial cars for the same period of 1912 was 20,018, valued at \$19,836,111, it is announced.

Exports of parts, not including engines and tires, are growing by leaps and bounds. The exports increased in value from \$328,700 in October, 1912, to \$728,470 in October last, and from \$3,936,110 to \$5,177,262 during the 10 months' period. Shipments of cars, by countries during the periods under consideration, were as follows:

	OCTOBER			
	1912	1913	Quantities	Values
France	42	\$ 24,820	59	\$ 35,759
Germany	45	45,432	32	27,923
Italy	13	9,785	18	19,172
United Kingdom	265	219,578	283	250,293
Other Europe	62	54,103	82	91,421
Canada	405	491,133	298	423,016
Mexico	17	30,719	24	41,354
West Indies and Bermuda	35	32,418	35	36,110
South America	191	202,610	182	181,230
British Oceania	264	230,665	356	310,163
Asia and other Oceania	186	167,072	231	221,694
Other countries	87	75,477	176	150,087
Totals	1,612	\$1,583,812	1,776	\$1,788,222

	TEN MONTHS ENDING OCTOBER			
	1911	1912	Quantities	Values
France	366	\$ 413,030	585	\$ 439,313
Germany	95	112,121	392	316,201
Italy	167	192,339	254	224,436
United Kingdom	2,776	2,407,373	4,207	3,163,696
Other Europe	685	635,378	1,340	1,098,761
Canada	4,300	4,770,911	6,393	7,704,772
Mexico	210	351,007	198	320,592
West Indies and Bermuda	236	270,994	273	283,116
South America	766	967,358	1,586	1,817,988
British Oceania	1,729	1,602,383	2,849	2,586,185
Asia and other Oceania	645	647,067	1,321	1,310,323
Other countries	221	238,161	620	570,728
Totals	12,196	\$12,608,127	20,018	\$19,836,111
			22,729	\$23,090,080

Twenty-nine motor cars, valued at \$74,646, were imported in October, as against seventy-eight cars, valued at \$170,410, imported in October a year ago. The imports for the 10 months' period declined from 694 cars, valued at \$1,573,584, in 1912, to 417 cars, valued at

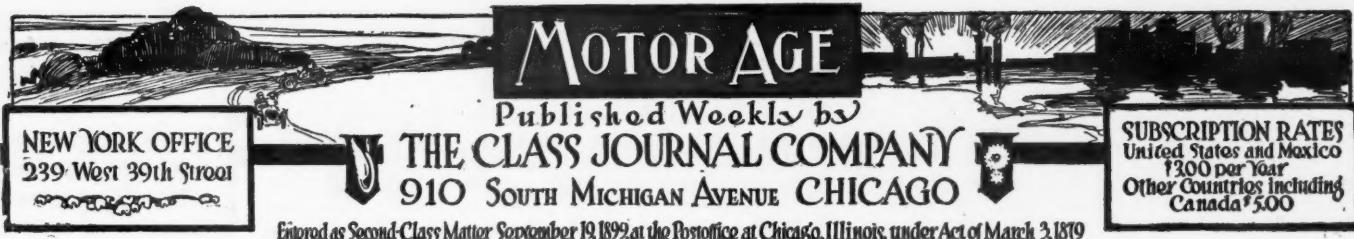
\$983,445, in 1913. Imports of parts, except tires, increased in value from \$18,528, in October, 1912, to \$50,595, in October last, and from \$241,262 to \$242,031 during the 10 months' period. The imports of cars, by countries during the periods under consideration, were as follows:

	OCTOBER			
	1912	1913	Quantities	Values
France	51	\$105,754	15	\$38,961
Germany	1	762	1	3,000
Italy	7	13,324	6	11,455
United Kingdom	8	24,318	5	16,691
Other countries	11	26,252	2	4,539
Totals	78	\$170,410	29	\$74,646

	TEN MONTHS ENDING OCTOBER			
	1911	1912	Quantities	Values
France	262	\$ 567,665	384	\$ 914,639
Germany	129	280,385	45	105,131
Italy	100	159,188	80	129,551
United Kingdom	127	305,531	115	278,583
Other Countries	155	344,512	70	145,680
Totals	773	\$1,657,281	694	\$1,573,584
			417	\$983,445

Exports of motor car tires during October were valued at \$237,116, as against a value of \$225,704 in October a year ago. During the 10 months' period of the

last 3 years the exports were valued as follows, according to government reports: 1911, \$2,080,517; 1912, \$2759,339; 1913, \$3,481,131.



Weight Reduction and Economy of Operation

NECESSITY is the mother of invention. This has been true for ages. It is true today. It will be true tomorrow. What has been done in the past can be better done in the future. Sheer necessity has brought about many improvements in the motor industry. It has brought about new designs; it has brought about new manufacturing processes; it has brought about new merchandising policies. Industrial organizations generally are slow to change unless merchandising conditions make such changes imperative.

OME of this necessity which makes invention necessary is needed at present in the motor car industry, and particularly in the designing departments of the factories. Motor cars today are too heavy. One maker recently mentioned of his car 3 years ago weighing 2,600 pounds, and now with the same motor and gearset it weighs over 3,600, this added weight being due to a longer wheelbase and added equipment. America is a long distance behind Europe in the question of car weight. Nevertheless it is true that the American car is more fully equipped than a European car, yet critics of both hemispheres are positive in their statement that in spite of this handicap the American car still is much heavier in proportion to the European product. Some say it is necessary because of our rougher roads, others that it is necessary because of the heavier bodies we fit, but when all is said and done, the fact remains that we are carrying too much weight, and that weight is the graveyard of performance of flexibility, of acceleration, of economy, of endurance.

THAT it is possible to accomplish the impossible and that it still is not too late to scrutinize what has been actually done in the past look for a moment at the greatest revolution yet worked in the motor industry. This was done by Scotland Yard in London, England, when it announced that motor buses running in the city of London must not exceed 3.5 tons in weight, at which time the majority of the makers were building buses weighing 4.5 and 5 tons. These bus manufacturers declared that the order of Scotland Yard would kill the industry, and that it meant the death blow of the motor bus. They were positive they could not cut weight to such an extent. What is the result? Weights have been cut to meet the requirements of the buses, and at the same time operation costs have been reduced from approximately 31 cents per mile to 13 cents and in some cases to 12 cents.

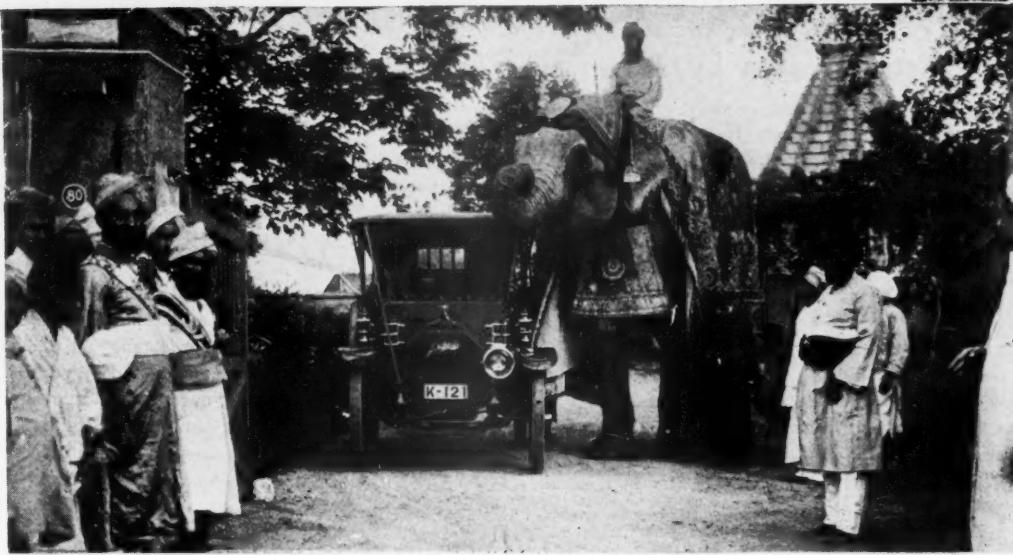
THIS weight reduction program was not initiated by the bus manufacturers. They opposed it. They organized themselves against the Scotland Yard ordinance and used every influence to have it countermanded, but to no avail. The chief of police had made his investigations, had set his limits, and it was beyond the power of the government to alter them. Several of the manufacturers admitted defeat. The London General Omnibus Co., in order to preserve its very existence, was compelled to take the matter itself, to engage its own engineering experts, to erect its own shops, and carry out its own weight reduction. It succeeded. Not only did it cut the weight from 5 tons to the 3.5-ton maximum, but was able by careful paring of weight to load-carry to preserve the strength of the bus in to to and add to some parts of the original designs that had not an adequate factor of safety. Bravo to any organization that can accomplish such results when others fail! Bravo to Scotland Yard that began the investigation!

AD Scotland Yard and had the London General Omnibus Co. not been compelled to meet the new conditions, it is a conservative statement to make that London today would be reeking with the vibration of 5-ton buses traveling over its city streets. Now, however, that the omnibus company showed the way, the bus manufacturers have fallen in line and a few of them are enterprising enough and have enough ability to build buses to meet the stringent requirements of weight, endurance, and quietness.

UT municipalities like London are not the only ones interested in the weight of motor vehicles. Here in our great United States of America users of passenger cars daily are asking about the weight of their machines. They evidently have come to the conclusion that heavy cars and economy of operation clash and they are asking daily for accurate information from the manufacturers as to the weight of cars. Some makers are most frank in taking the public into their confidence. When more of them do so the buying public will be pleased better. Weight is going to become more and more pertinent to the motor industry.

ANOTHER page may be torn from the note book of the London General Omnibus Co. by American truck manufacturers, namely, that of cost of operation. The omnibus company has shown that with its buses traveling 30,000 miles per year, and with them painted twice in the season, the cost of operation, including the drive, can be kept at 13 cents, whereas many operators of 3-ton trucks are acknowledging their cost of operation to be as high as 23 cents, this figure not including two paintings a year. The omnibus company in London, as well as the Fifth Avenue Coach Co. in New York, has set about in a business way to get cost of operation to the lowest level. The two concerns have engaged experts of the highest standing, and these experts have cut the operating cost more than in half. Their very existence has depended on reduction of cost of their motor vehicles in this proportion.

IF the motor bus can be reduced in cost of operation there is no reason why a motor truck handling merchandise cannot have its operating cost reduced in a more or less proportional rate. Such reduction cannot be accomplished unless the operating system is placed in the hands of experts; unless the garaging is placed in the hands of experts, unless the drivers come under the control of experts; unless the tire mileage and tire usage are superintended by men who know; unless, in a word, there is a genuine efficiency regime inaugurated. You cannot reduce operating costs on a hit-or-miss basis. You cannot reduce operating costs when the reins are placed in the hands of incompetent amateurs. You cannot keep truck maintenance costs down when the garage superintendent is some graduate mechanic with little engineering knowledge to form a foundation for his workmanship. You cannot reduce maintenance costs without drivers schooled in the niceties of the art, and under rigid daily inspection. You cannot keep maintenance cost down unless you have periodic inspection of the vehicles, these bus concerns insisting on inspections every 10 days. Making a success of motor truck operation is a science of business and not a guess-work program.



On the road to Mandalay, there's "elephants a-pilin' teak," Kipling tells us, but the English bard mentions no motor car. But they have them over there, as the above illustration shows. Recently the rajah of Punganur was married to a beautiful Hindu princess and to celebrate the occasion the royal bridegroom ordered a photograph taken of his honeymoon pachyderm in company with a Mitchell car owned by Captain Saunders of the English army.



On the two-hundredth anniversary of the birth of Padre Junipero Serra, founder of the California missions, a concrete cross set in boulders taken from the ruins of his first church was unveiled at Santa Barbara. Motor cars were of the greatest importance in handling the large crowds that attended the ceremonies.



Motor enthusiasts of Allen county, Indiana, have placed 320 red, white and blue signs along the route of the Lincoln highway and modestly claim that theirs is the first county in the country to be completely marked.



Boosting the Lincoln highway is the latest achievement of Neil Patterson of Detroit, a former record-breaker at the Olympic games, who has completed his trip of over 5,000 miles from San Francisco to New York in a Lozier. Patterson was accompanied by a moving picture photographer who has taken films of scenes along the route of the proposed ocean-to-ocean highway.



Earl Cooper, America's champion driver for 1913, never will want for a drinking cup. Five victories and seven trophies are his haul for the season. In the accompanying illustration, the conquering Californian is shown at the radiator of the Stutz. W. M. Brown, owner of the car, is at the rear.



Calls on Congress for Federal Good Roads Legislation

Important Action Taken by American Road Builders' Association

PHILADELPHIA, Pa., Dec. 12—The tenth annual convention of the American Road Builders' Association came to a close last evening with a banquet after one of the most important and successful gatherings ever held in the history of the association.

The closing sessions were marked by the adoption of two resolutions which if carried to fruition will have an important bearing on the good roads problem. One urged the cooperation of President Wilson and congress to supplement existing legislation of the several commonwealths in the cause of improved highways, asking for sufficient funds to make an investigation of the question of federal appropriations for road construction and the appointment of a commission by the president to devise the system of apportionment.

It also was resolved that there should be an amalgamation of all highway and the leading motor organizations. This would mean a consolidation of the American Road Builders' Association, the American Automobile Association, the Automobile Club of America, the American Highways Association, the National Highway Association and the United States Highway Association. It is believed that all the organizations mentioned would become a party to the union. This combination of powerful motor organizations and the highway associations working in unison would not only do more effective work, but could make a long stride, forward in the settlement of the highway problem. Both resolutions carried unanimously.

Several cities put in a bid for the honor of holding the next convention, but no decision was made, the most likely selection being Ontario, Canada.

Every phase of road building, its construction, maintenance, characteristics and suitability for many different kinds of travel were discussed in all their particulars during the 4 days of the convention. The convention opened on Tuesday and closed last night with the annual banquet at the Bellevue-Stratford.

Visitors from nearly every state in the union and from Canada were in attendance to the number of 1,500 or more and listened to experts swap ideas, the ultimate realization of which would checker the whole United States with a network of good roadways connecting all the principal cities, towns and even villages each with the other.

In connection with the convention moving pictures depicting different conditions of roads and their construction throughout the country formed a daily feature. An exhibit was held in the armory, more than 100 exhibitors displaying road machinery, construction material and other necessities for road building. As some of the exhibits

were too bulky for adequate showing in the armory building, a tent was erected on Callowhill street just off Broad, under which the various pieces of machinery were shown in actual operation.

Business sessions were held every morning and afternoon, over which Samuel Hill, president of the association, presided.

NEW MOTOR CAR GUARANTY

New York, Dec. 16—The Automobile Chamber of Commerce has issued the standard form of guarantee as approved at its meeting held December 3. It is as follows:

This is to certify that we, the of warrant each new motor vehicle manufactured by us, whether passenger car or commercial vehicle, to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall within 90 days after delivery of such vehicle to the original purchaser be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sale of our vehicles.

This warranty shall not apply to any vehicle which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any commercial vehicle made by us which shall have been operated at a speed exceeding the factory rated speed or loaded beyond the factory rated load capacity.

We make no warranty whatever in respect to tires, rims, ignition apparatus, horns or other signaling devices, starting devices, generators, batteries, speedometers or other trade accessories, inasmuch as they are usually warranted separately by their respective manufacturers.

In witness whereof, the said company has caused this warranty to be signed by its duly authorized officers.

..... President.

..... Treasurer.
Date, 191...

CREDITORS AFTER ARISTOS CO.

New York, Dec. 15—A petition in bankruptcy has been filed against the Aristos Co., dealer in motor car accessories, at 250 West Fifty-fourth street. It was alleged that, while insolvent, the company since September 2 made preferential payments to six creditors aggregating \$6,585. The company is a Delaware corporation, with a capital stock of \$400,000. C. D. Knapp was president and Henry C. de Rham, treasurer.

GENERAL MOTORS MAKES REPORT

New York, Dec. 16—Stockholders of the General Motors Co. have every reason to feel satisfied with the way in which the new year's business has opened up. The first 4 months of the current fiscal period, which began August 1, produced gross sales of \$25,307,941, against \$20,252,389 for the same months of 1912. This is an increase of \$5,055,552 or 25 per cent. During August, September, October and November the company sold 18,078 cars,

which compares with 13,508 in the same period of 1912, an increase of 4,570 cars.

The present management has steadily sought to make the factory operations less seasonal and the 25 per cent gain in gross sales for the first 4 months is in large part due to a shorter factory suspension after the close of the 1913 fiscal year on July 31.

The last cash statement of the General Motors, December 4, showed \$6,038,558 in the bank, or considerably over \$1,000,000 more than a year ago at this time. The outstanding 5-year notes are now \$2,000,000 smaller in amount than in 1912, so that the cash position of the company may properly be said to be \$4,000,000 stronger than a year ago.

The number of employes on November 29 was 16,815, a small shrinkage from last year.

V-RAY CO. A CANFIELD LICENSEE

New York, Dec. 13—The V-Ray Co., Marshalltown, Ia., has taken out a license under the Canfield patent No. 612,701. This makes the fifteenth new license issued on this spark-plug patent since the recent decision handed down, giving A. R. Mosler a permanent injunction on the manufacture of all spark plugs with a recess behind the electrodes and making practically every plug manufacturer an infringer, it is claimed.

FRONTIER COMPANY BANKRUPT

Buffalo, N. Y., Dec. 16—The Frontier Tire and Rubber Co., with offices here at 1054 Main street, filed last Saturday voluntary petition in bankruptcy liabilities being listed at \$88,255.91 with assets of \$66,738.57. In the petition it is stated that this action was taken upon resolution adopted at a meeting of the board of directors of that concern on December 11. A. R. Robertson, the company's treasurer, filed the petition. F. V. E. Bardol of Buffalo is the heaviest creditor, having a claim against the company of \$12,873. Four other creditors having claims aggregating \$12,573.19 are M. F. Dirnberger, Jr., J. W. Gibbs, George T. Roberts and Orson E. Yeager. The claims are for cash advanced. The assets of the Frontier concern consist of \$11,127.72 worth of stock, \$36,531.86 worth of machinery and tools and \$15,535.45 due on accounts.

QUAKERS ELECT HUYETTE

Philadelphia, Pa., Dec. 13—At the eighth annual meeting and election of the Quaker City Motor Club this week at headquarters the following were selected to serve the ensuing year: Paul B. Huyette, president; G. Douglas Bartlett, first vice-president; B. H. Kirkbride, second vice-president; Ralph L. Murray, treasurer; A. E. Adams, secretary.

Olympia Gives Critics Line on Foreign Cyclecar Trend

Thirty-three Exhibits of Little Machines, Prices Ranging from \$350 for Monocar up to \$1000 for Light Car—Tendencies as Brought Out by Exhibition

TREND OF GENERAL CYCLECAR DESIGN AS NOTED AT THE OLYMPIA SHOW

GENERAL CYCLECAR DESIGN

Shaft-driven	four-wheelers	62
Monocars		5
Belt-driven	four-wheelers	21
Friction-driven	four-wheelers	9
Three-wheelers		13
Chain-driven	four-wheelers	34

ENGINE AND NUMBER OF EACH

J. A. P.		19
Precision		19
Chapuis Dornier		3
White & Poppe		1
Fafnir		2
Salmon		1
Anzani		1
Blumfield		2
Alpha		1
Buchet		1
Dorman		2

COOLING SYSTEM USED

Three-wheelers—		
Air-cooled		7
Water-cooled		6
Chain-driven four-wheelers—		
Air-cooled		6
Water-cooled		7
Belt-driven four-wheelers—		
Air-cooled		12
Water-cooled		10
Friction-driven four-wheelers—		
Air-cooled		1
Water-cooled		8
Shaft-driven four-wheelers—		
Air-cooled		7
Water-cooled		55
Monocars—		
Air-cooled		5
Water-cooled		0

TRANSMISSION SYSTEMS IN VOGUE

Three-wheelers—		
Chain		3
Shaft and chain		5
Shaft and bevel		4
Double chain		1
Chain-driven four-wheelers—		
Single chain		1
Chain		11
Shaft and chain		1
Belt-driven four-wheelers—		
Shaft and belts		6
Chains and belts		10
Shaft friction gear and belts		2
Friction gear and belts		1

Friction-driven four-wheelers—

Friction and chain		8
Friction and shaft		1
Shaft-driven four-wheelers—		
Shaft and bevel		35
Shaft and worm		19
Monocars at the show—		
Single chain		3
Chain		1
Chain and belts		1

STEERING SYSTEMS UTILIZED

Three-wheelers—		
Pillar		3
Direct		5
Wheel		2
Wheel and Chain		2
Chain-driven four-wheelers—		
Wire and bobbin		1
Direct		5
Rack and pinion		4
Worm and sector		1
Belt-driven four-wheelers—		
Wire cables		8
Direct		4
Worm and nut		3
Rack and pinion		2
Center pivot		2

Friction-driven four-wheelers—		
Rack and pinion		5
Direct		1
Wheel and sector		2
Worm and nut		1
Worm and sector		1
Shaft-driven four-wheelers—		
Direct		3
Rack and pinion		13
Worm and pinion		3
Pillar		1
Worm and sector		16
Steel cables		3
Bevel and sector		3
Worm and nut		2
Worm and segment		6
Worm and wheel		6
Eccentric		1
Monocars and how driven—		
Wire and bobbin		4
Direct		1

TYPES OF CLUTCHES USED

Three-wheelers—		
Plate		1
Multiple-disk		1
Leather cone		5
Expanding		2
Disk		2
Metal		1

Chain-driven four-wheelers—

Multiple-disk		3
Plate		5
Disk		1
Leather cone		1
Ferrodo cone		1
Belt-driven four-wheelers—		
Metal cone		2
Leather to metal		4
Cone		1
Plate		1
Multiple-disk		1
Leather cone		1
Shaft-driven four-wheelers—		
Leather cone		37
Cone		17
Multiple-disk		8
Multi-plate		3
Single-plate		1
Metal disk		1
Monocars—		
Multi-disk		4
Metal cone		1

NUMBER OF SPEEDS IN CYCLECARS

Three-wheelers—		
Two speeds		8
Three speeds		1
Three speeds and reverse		2
Two speeds and reverse		1
Chain-driven four-wheelers—		
One speed		1
Two speeds		1
Three speeds		1
Two speeds and reverse		5
Belt-driven four-wheelers—		
Two speeds		7
Three speeds and reverse		4
Four speeds and reverse		2
Seven speeds and reverse		1
Variable		7
Friction-driven four-wheelers—		
Four speeds and reverse		2
Five speeds and reverse		2
Six speeds and reverse		2
Seven speeds and reverse		3
Shaft-driven four-wheelers—		
Two speeds and reverse		10
Three speeds and reverse		51
Four speeds and reverse		1
Monocars—		
One speed		3
Two speeds		2

NOTE—When more than one type or power of car is made the figures include each type.

LONDON, Dec. 6—The Olympia show, just over, though containing cycles and motorcycles within its doors, drew the crowds largely through the interest in the cyclecars and light cars exhibiting.

The cyclecar movement is undoubtedly established, there being no fewer than thirty-three separate exhibits. The prices ran from \$350 for the single-cylinder, single-speed, single-passenger Carden monocar to as high as \$1,000 for the light cars.

Many Types Exhibited

Out of the list of four-wheeled cars exhibiting sixty-four are of the simple transmission type while but sixty-two are of the light-car shaft-drive type. The greater number of cars—including the light cars—are fitted with water-cooled motors. Thirty-eight, however, are air-cooled and of the water-cooled fifty-four are light cars of the shaft-drive type; so that the real cyclecars are mostly air-cooled. The weight and wide tread of the light cars has forced them to water-cooling. Nine-

EDITOR'S NOTE—In following the report of the British cyclecar show at Olympia this year it should be borne in mind that the conditions abroad have brought forward cars for those particular conditions, and that because England has followed a certain lead is no reason for accepting this practice as applicable to American conditions. The show demonstrated the great advance that has been made in the cyclecar and light car during the year, but while there is an untouched field for the car types abroad, the greater interest in America is for cars which can be run cheaper than the light cars which America has produced for many years. It has been said that the light car has killed the cyclecar movement abroad, but the show report proves that the simple-type machines are gaining and that the real cyclecar is by no means dead. These simple cars are showing up in contests with as great reliability as the small-car types and have proved their field.

teen cars shown are belt-driven, thirteen chain-driven and nine fitted with friction transmission. Only one has friction and belts, the practice most followed in America at present.

Of the chain-driven four-wheelers, five have three speeds and reverse, but these are the more expensive vehicles. One car has but one speed and no reverse, the Carden monocar referred to previously.

There is a distinct gain in favor of friction drive, this drive but just being recognized in England through its remarkable performances during the past year by the G. W. K. team which always has obtained perfect scores even when no other cars finished perfect. This happened in the A. C. U. 6-day trial and the Scottish 6-day trial, when the three cars entered were the only ones finishing perfect and all three accomplished this end. In the A. C. U. 1-day trial recently this team was the only one finishing perfect. The Pyramid friction-belt car has added to friction enthusiasts by its work in recent trials. France is adding several friction-drive cars also. The tables show nine friction-drive cycle cars exhibited at the show.

Cyclecar Developing

The cyclecar is at present in a state of development, and no real definition has as yet been given which satisfies all. The main difference between the cyclecar and the light car is, in the present definition,

merely a matter of weight; those over 672 pounds being put in the light-car class. If one considers that the cyclecar movement is a demand for the minimum cost motorizing, however, it will be seen that the definition hardly defines, for many cars within the weight are too expensive in matter of first cost to fit the spirit of the movement, and too complicated to allow of minimum cost running.

The term cyclecar is not a very appropriate one, for many of the cars of this class really are large cars in miniature and have nothing in common with that class of work one usually associates with motorcycle construction.

The Original Cyclecar

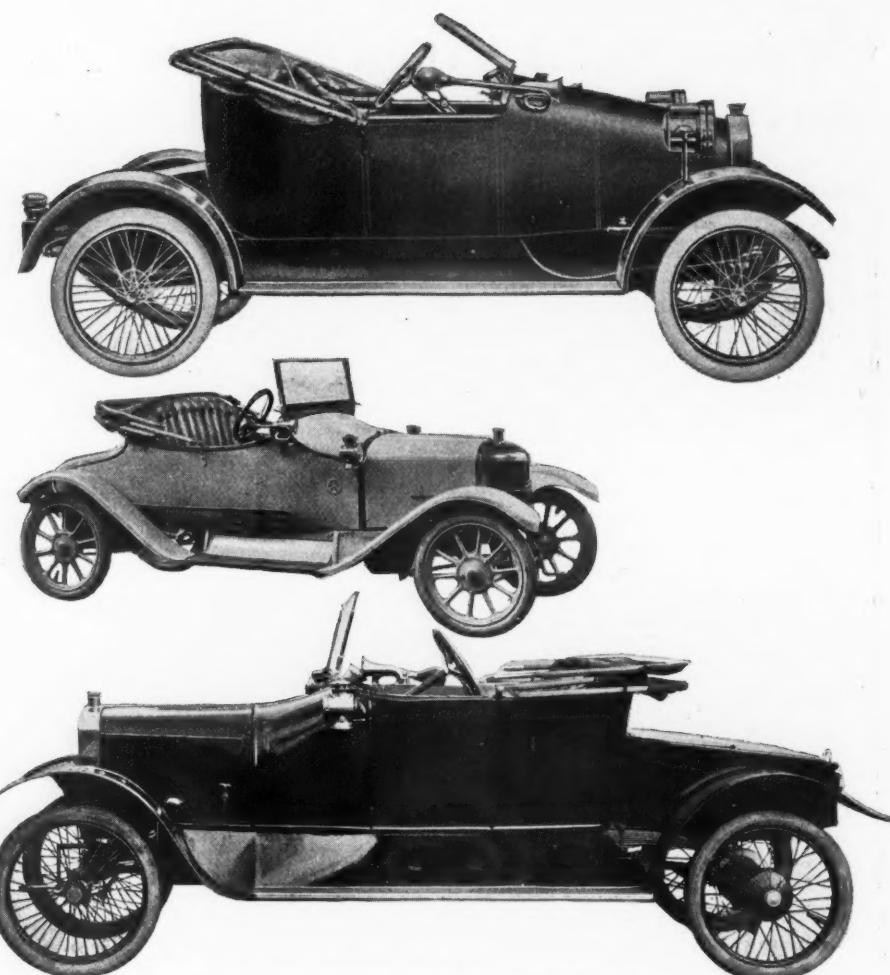
The original cyclecar started out with a single or twin air-cooled engine and belt drive, but today the art has so far progressed that within the set weight it is impossible to construct such cars with a four-cylinder, water-cooled engine 60 millimeters bore by 100 millimeters stroke, a three-speed gearbox and a worm-driven back axle, steel detachable wheels, in fact a car in all respects similar to the modern high-powered car in design.

From the term cyclecar one would of course infer that this type of car would be the specialty of the builders of cycles and motorcycles. This, however, does not appear to be the case as the leading cars of the class are not being produced to any major degree by the cycle firms.

There are of course a large number of small cars which are slightly over the weight specified, which are therefore not designated as cyclecars, being termed light cars, and it therefore is evident that sooner or later some distinction other than weight may be called. However, the aim of all the builders of light cars and cyclecars is to produce reliable carriages to carry two passengers which shall be light on the pocket, light in weight, light on tires and light in gasoline consumption.

In a new development one is sure to find a number of freak cars, and there are many designs which are clearly the outcome of inexperience, and bear the mark of the ingenious but misguided enthusiast.

There are a good many novel features



UPPER ILLUSTRATION—CRESCENT LIGHT CAR. MIDDLE ILLUSTRATION—AUTO-CARRIER. LOWER ILLUSTRATION—MARSHALL-ARTER

among transmission systems, and in some of the cyclecars that are belt-driven variable-diameter pulleys are fitted in several cases and when solid or fixed pulleys are fitted there is an undoubtedly tendency to increase their diameter, doubtless for the purpose of getting a better grip upon the pulley and of diminishing the pull upon the belt.

Ingenious Chain Adjustment

There are some ingenious methods shown for adjusting chains and on the shaft-driven models a spring drive has been adopted by one manufacturer.

It was a noticeable feature of the show that a large number of women were present, and many of them displayed considerable knowledge of the technicalities and were evidently bona fide purchasers. Motorizing is gaining many adherents among women, and their numbers will increase with greater rapidity with the introduction of a wide choice in easily handled small cars such as the motorcycle exhibition provides. Their small size and low weight enable them to be very easily driven by a woman.

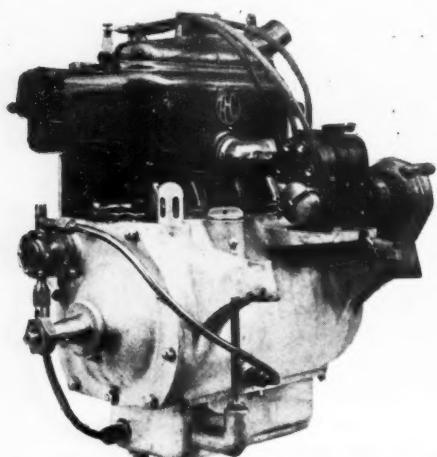
Excellent protection from the weather, clean and inclosed transmission, render driving a not uncleanly matter. Interchangeable wheels, which now are common to most makers, very much reduce tire

trouble, while easy-starting devices are coming into prominence. A pedal-starting apparatus is a common feature of the sidecar combination, and except that most of these small engines are very easily started there is no reason why some similar device should not be found on every cyclecar of the future.

Considering the more important features in detail and referring in the first case to engines at the show, there was a marked tendency to employ the four-cylinder engine and a number of makers, who, during the 1913 season, fitted twin-cylinder, vertical, water-cooled engines, now show four-cylinder models.

Demand for Four-Cylinders

In a four-cylinder engine, owing to the increased number of parts, there are more possibilities of trouble, though admittedly they are remote, and thus the present tendency is not towards the simplification of the power plant, but as the public is apparently asking for the four-cylinder, the manufacturers are justified in meeting that demand. It has been proven that the four-cylinder engine can be run quite as cheaply as the two, and it is admittedly a much pleasanter engine to control, especially with the popular automatic foot-controlled carburetor fitted to a large number of engines on show.



FOUR-CYLINDER AUTO-CARRIER MOTOR

A popular engine is the Blumfield. These engines are made in single-cylinder form, as V-type engines and a very well designed 10-horsepower four-cylinder water-cooled one is also to be seen. The V-type engines are made both air-cooled and water-cooled and the same remark applies to the single-cylinder ones.

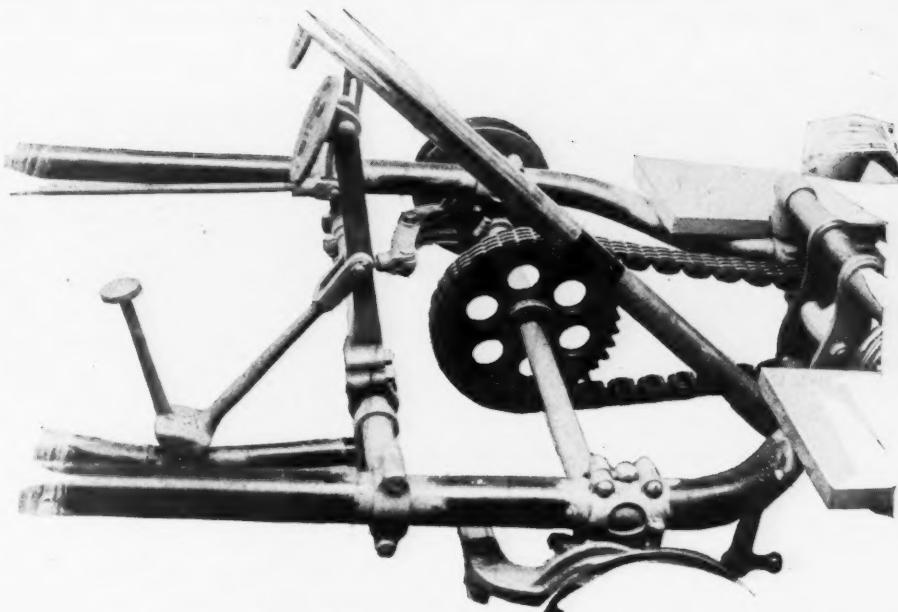
The Singer four-cylinder engine exhibits some excellent designs and constituted one of the most compact power plants seen throughout the show.

Features of the Day-Leeds

In discussing compact design mention should be made of the Day-Leeds 10-horsepower four-cylinder engine with two-bearing crankshaft and roller-chain driven camshafts and magneto. The cylinder and top half of the crankcase are cast in block and no doubt this feature gives considerable rigidity to the whole design, and at the same time reduces the amount of machining necessary.

Another excellent little engine—but having two cylinders only—is the Coventry-Simplex. Here again the cylinders are block, and the crankshaft has ball bearings and among other up-to-date features is the silent-chain drive of the camshaft.

Again the T. A. B. engine on the score of compact and clean design leaves nothing to be desired; this little engine has a built-up crankshaft and mechanical lubrication.



DUO SILENT-CHAIN DRIVE BETWEEN ENGINE AND COUNTERSHAFT

The Premier company, Coventry, showed a nice four-cylinder block engine with a bore and stroke of 60 by 92, having thermo-syphon cooling.

Water-cooled engines have their jacket arrangements suited for thermo-syphon cooling, and there is little doubt that the pump is de trop in the case of engines of

such small cylinder capacity as most of those exhibited. The most important item of the thermo-syphon system, the radiator, is generally of the tubular type; doubtless the honeycomb type is more expensive and is as well more likely to start a leak on the road due to some undue strain being put upon it.

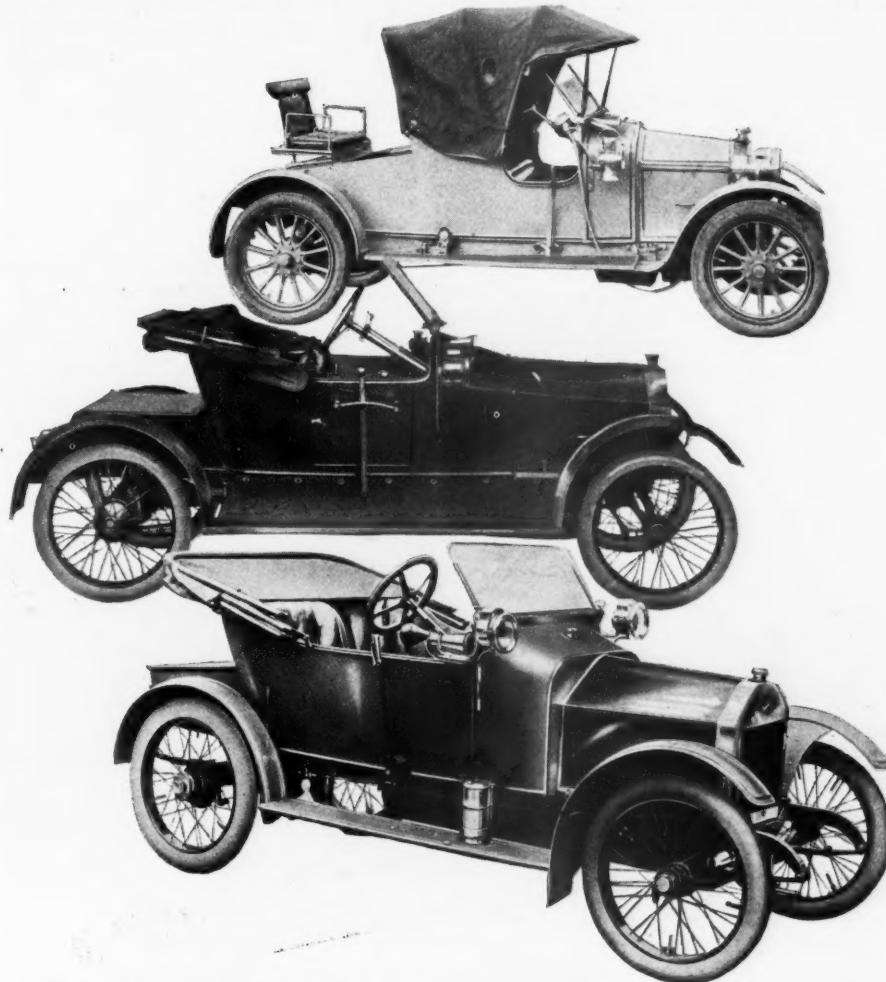
Automatic carburetors generally are fitted and the design is in most cases such that the throttle is controlled by a pedal; some makers, however, have provided a hand control as well, and though this leads to some slight complication yet in the opinion of many drivers the advantage of combined control is worth the additional parts.

Large Bearings in Gearbox

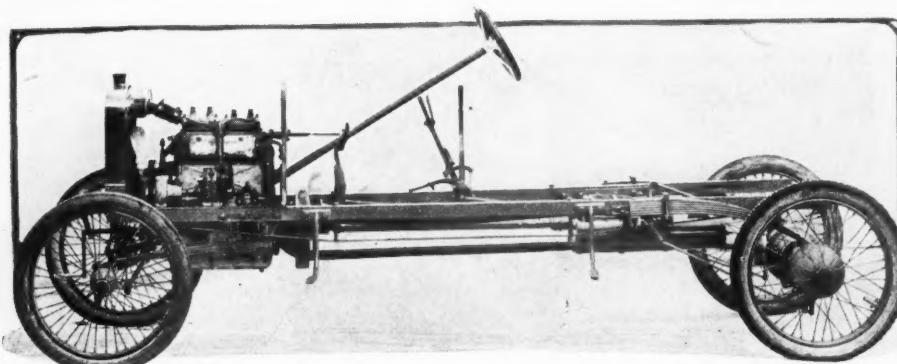
With regard to the gearbox, it was noticeable that larger bearings are being provided and that tooth width has been increased. The fact was overlooked in the past that the speed-change mechanism of the light car or cyclecar has to endure very much more frequent use than is the case with the change-speed gear of large and heavily powered cars. Many a powerful car can run all day without the use of half the gears contained in the gearbox—the drive being almost continuously direct. This is far from the case with the cyclecar when in bad weather and over heavy roads the speed lever has constantly to be handled. It was noticeable at Olympia that manufacturers now thoroughly realize this fact.

Presumably on the score of expense the four-speed gearbox is not much used, though clearly the less powerful the engine the more does it become necessary to increase the choice of gear ratios. It is not at all unlikely that during the coming season or perhaps at next year's exhibition, the four-speed gearbox will appear as a necessary part of the light car, if not of the cyclecar.

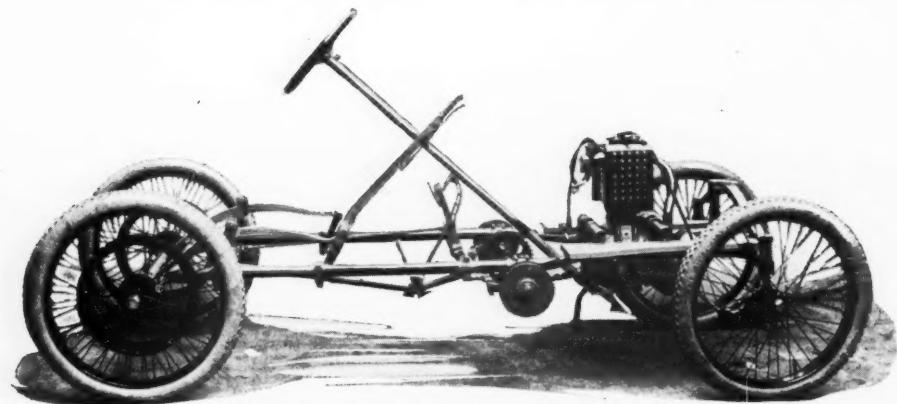
Makers have found it desirable to reduce



UPPER ILLUSTRATION—WOLSELEY STELLITE. MIDDLE ILLUSTRATION—HUMBERTTE.
LOWER ILLUSTRATION—SWIFT



MARSHALL-ARTER CHASSIS WITH GEARSET AND AXLE COMBINED



CHASSIS OF DUO WITH REAR SPRINGS MOUNTED ON ROCKING ARMS

low-speed gears somewhat, the low gear being considered, apparently, as it should be—an emergency gear. As an example of this tendency, the 1913 Swift had a ratio of 12.6 to 1, whereas in the 1914 model this ratio has been dropped to 16.8 to 1. And, again, in the case of the Singer the low-gear ratio of which formerly was 11.5 to 1, the 1914 model has a ratio of 15 to 1.

Low Gear for Emergencies

There is no doubt that there is wisdom in providing a very low gear for emergencies, such as very steep hills of 1 in 5 or thereabouts, and for travelling over very heavy inclined roads against strong head winds; such an emergency gear also proves its usefulness when starting under severe conditions.

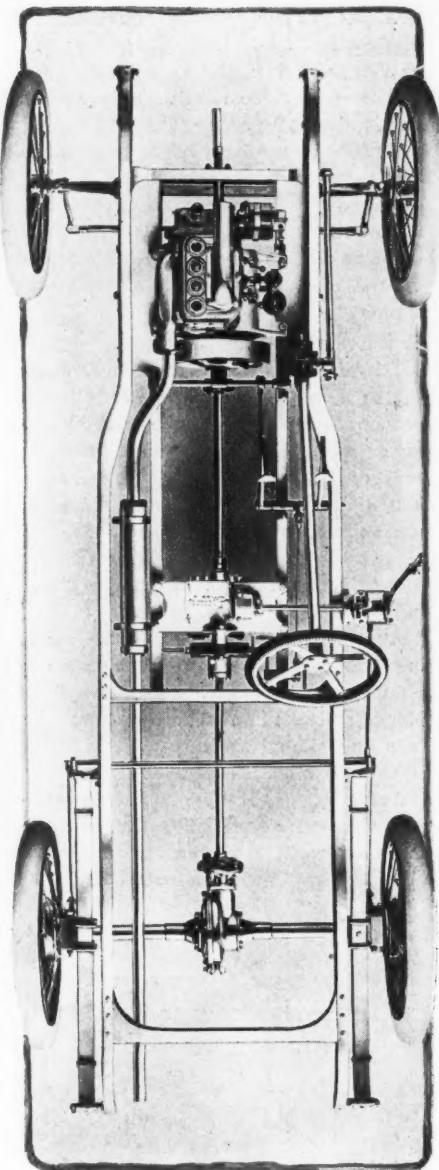
Occasionally light cars are met with having only two speeds, and it is considered likely that this is a practice that will not last long. The Stellite and Warren-Lambert are examples of this type, and the makers state that practically all running can be done on the top gear and that the low gear is an emergency one only.

As regards the important consideration of the final drive, there appeared to be about equal numbers of bevel and worm. Perhaps the reason why more makers are not fitting a worm drive is on account of the fact that undoubtedly it is more difficult to manufacture a really efficient worm and worm wheel than a bevel and crown wheel. Perhaps, too, the question of silent running is not of so great an importance in the case of a cyclecar as in the case of the larger type of car when a high price is being paid.

Quite a number of the vehicles on show were entirely without a differential gear, and on the score of simplification this is a step in advance.

Tubular frames have in a few cases been replaced by pressed steel frames, and there is little doubt that if the output justifies such a course the adoption of the pressed steel frame is a step in advance. The Swift is an example of the abandonment of the tubular frame for one of pressed steel.

Detachable wheels as a standard were seen in numbers, and some of them are of the wire variety, whereas the majority are of pressed steel, which latter are apparently found to give extremely satisfactory results on light cars, and an added advan-

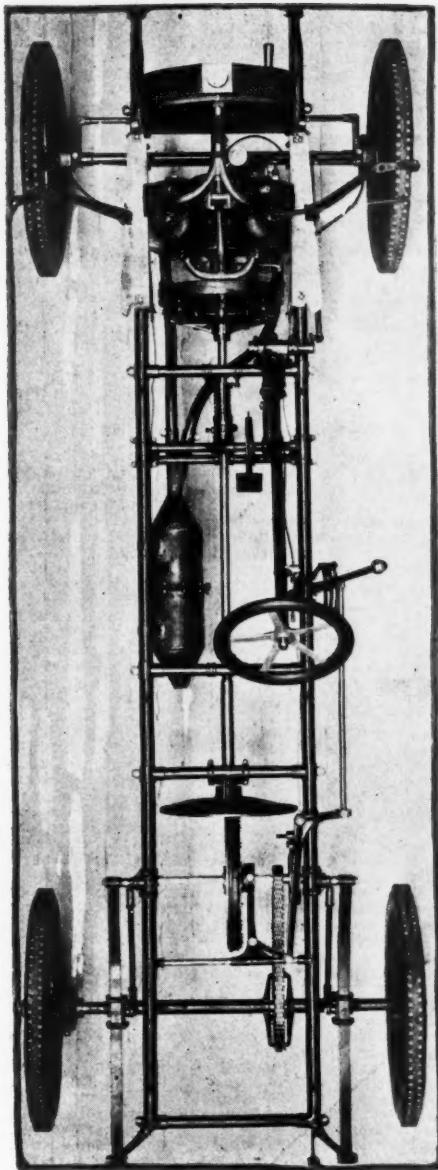


VIEW OF SWIFT CHASSIS

tage is that the spare wheel does not take up much room, which is an important point on a small car on which there is not too much spare space. When detachable wheels form part of the standard equipment, a

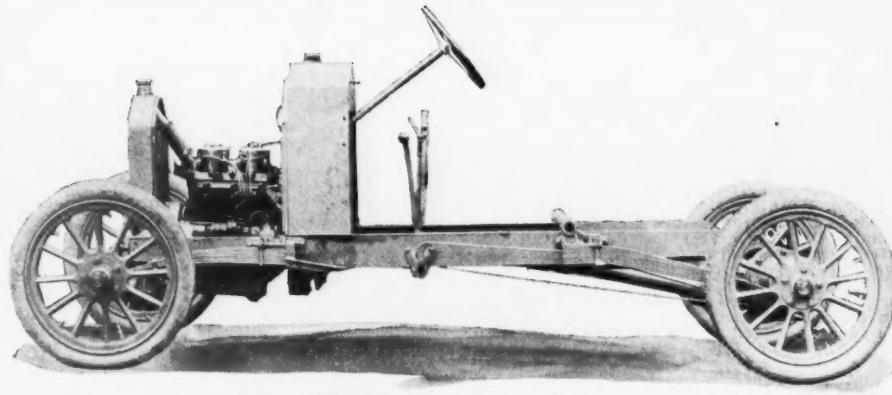


REAR END OF DUO CYCLECAR SHOWING DETAILS OF SPRING MOUNTING

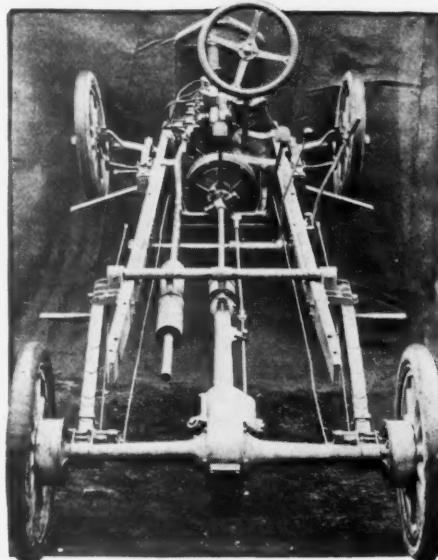


CHASSIS OF CRESCENT LIGHT CAR

spare wheel is always included in the selling price. There are a certain number of cases in which this wheel is supplied without a tire, which appears to be a rather short-sighted policy. Of course it is a question of reducing the cost to the maker as much as possible, but a spare wheel is



CHASSIS OF THE WOLSELEY



PLAN VIEW OF WOLSELEY CHASSIS

of no use to the purchaser unless provided with a spare tire.

The bodywork has been considerably improved in practically every machine. It was found that, in a number of cases, the body developed rattle after a time, owing to the light weight of the vehicle and the vibration engendered by driving at high speeds over rough roads. More solid bodies are now fitted, providing greater comfort to the occupants.

Consideration of a number of makers' prices shows that there is a tendency to in-

crease these somewhat, but an examination of the machines points strongly to the fact that this increase of price is justified by the extra value given in the shape of more comforts and more conveniences generally, and sometimes the addition of a spare wheel.

It was noticeable that a few makers include complete dynamo lighting sets in the price of a light car, and there is a demand for small sets of moderate cost in place of an equipment of the usual oil and acetylene lamps. A special model 10-horsepower Singer is listed for next year complete with lighting set.

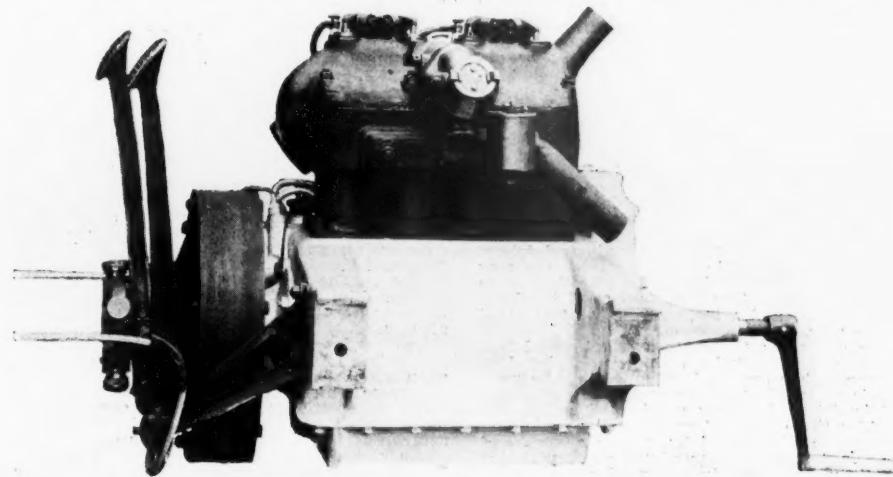
Improving Body Lines

Some of the small cars, such as the Swift, have a very neat appearance enhanced by a tapered bonnet and radiator with rounded edges; while running boards on either side give to the machine a very finished appearance. Even the neat superficial examination of the exhibits showed that a great deal of time has been spent by manufacturers and their designing staffs during the past year in an attempt to improve the machines for which they are responsible; perhaps it was to be expected, however, that a greater number of manufacturers would have entered the cyclecar field by the present date—the demand for such vehicles having recently shown itself to be a very large and increasing one.

The most interesting exhibits to the American in touch with the movement in the States undoubtedly were those of the real cyclecars, and of course four-wheelers.

The simplest of all is, of course, the Carden monocar. This car weighs about 375 pounds and has a body shaped like a square-sided cigar. The tread is less than a yard, and the steering accomplished by turning the entire front axle. The one-cylinder air-cooled motor is just back of the driver and drives direct by chain to the rear axle, which is solid with no differential. A clutch is fitted as on a motorcycle but there are no change gears. This car is for city work and level roads and can make 40 miles per hour and climb average grades. On steeper hills the driver can run alongside.

In the Pyramid light car an 8-horsepower J. A. P. fan-cooled engine is set across a pressed steel frame and the engine has a large external flywheel incorporated a sliding universal joint within a large aluminum oil



CARBURETER SIDE OF WOLSELEY STELLITE MOTOR

casing while a short shaft transmits the power to a large friction disk driving another disk sliding on a cross shaft, which is formed of a 2-inch diameter tube carrying adjustable pulleys, whence the final drive is by belts to the rear wheels.

In the shape and application of the friction disks striking originality has been shown. The standard form of friction drive, employing a flat driving disk, suffers from the defect that the spring pressure is constant, thus causing unnecessary wear on the higher gears. In the Pyramid, however, this undesirable feature is avoided, the spring pressure varying proportionally with the gear ratio. The face of the driving disk, instead of being flat, is formed in two steps. Thus for first and second speed the driven disk rotates on the raised boss, but for the third speed the disk rotates on the lower level, and as the driving disk has moved nearer the countershaft the spring pressure is decreased. For top gear, one side of the friction disk is bevelled, and the driven disk is moved sideways until this chamfered edge engages with a bevel on the driving disk, the spring pressure being again reduced. At the same time, between the two bevels, there is a true rolling contact, and no slipping takes place. A simple-interlocking device, between the clutch pedal and the gear lever, prevents damage to the disk by running on the edge of the boss.

The frame is carried on the straight tubular axles by quarter-elliptic springs, the rear ones serving as radius rods. Steering is by rack and pinion.

Duo Light Car Described

The Duo Light car has a silent-chain drive from the engine to the countershaft, and the countershaft has at each end a variable-diameter pulley and these pulleys take belts which drive large pulleys upon the rear axle. In order to adjust the tension of the belts to suit the pulley diameter, a very ingenious arrangement is provided. The rear springs, inverted semi-elliptics, are mounted upon rocking arms; the forward ends of the springs are also attached to rocking arms pivoted to the frame. The right-hand side arm is extended to form a lever and by the movement of this lever, and through the medium of the springs, the whole back axle can be shifted forward or backward to tighten or slacken the belt. The expanding pulleys are automatic in action and answer to the requirements of the belts.

Little alteration is to be found in the design of the G. N. cyclecar for 1914, all its interesting features being retained. The front springing has been modified. Instead of the double quarter-elliptic springs formerly used, single quarter-elliptics are fitted, these being placed on top of the frame while substantial radius rods take the place of the lower ones. In order to counteract the torque from the bevels bending the frame, tie-rods have been added. All the well-known features remain, including the air-cooled 90-degrees, twin engines, the shaft and bevel-driven countershaft and the simple two-speed gearset, operated by dog clutches.

One of the most interesting features of the V. A. I. cyclecar is the provision of a separate clutch, although friction disks are employed in the transmission system. The clutch is neatly placed close to the engine, and is operated by the same pedal as the friction disks. The cross-shaft, which carries a differential, is fitted with two sprockets, one at either end, the final drive being by two chains to the back wheels. The steering is by an internally toothed sector working in conjunction with a pinion.

There are two models of the Warne, one a belt-driven machine and the other a light car having shaft drive. The former has a very novel type of reverse, consisting of two wheels mounted independently side by side, and one fixed to the sprocket driven by the engine chain and the other attached to the low-gear sprocket. Another wheel, placed in a plane at right angles to the others, can be brought into contact with the latter and so a friction reverse is obtained.

Three-Wheeled Auto-Carrier

The well-known Auto-Carrier's sociable, a reliable three-wheeler, has a slow-moving, single-cylinder engine; the engine is air-cooled but the draught is assisted by two fans driven by friction off the external flywheels. A roller chain transmits from the engine to a two-speed planetary gearset mounted in the rear wheel. A plate-clutch is used.

The 10-horsepower, four-cylinder, water-cooled engine, 59.1 by 100, has vanes on the flywheel periphery for drawing air through the radiator. The oil pump is at the back end of the crankcase and is driven off the camshaft. The crankcase is built on the one-piece system and has a large door at the back for inserting the crankshaft. There is a large detachable sump and oil reservoir beneath the crankcase proper.

The chief chassis novelty is the rear transmission unit, which includes the propeller shaft casing, the three-speed and reverse gearbox, the live axle and the differential casing as well as the foot and hand brakes. This latter brake consists of a fabric-faced annular disk

which is pressed into contact with a revolving disk on a continuation of the propeller shaft. At the end of the propeller shaft casing a chamber is cast to receive the gears and worm and worm-wheel, brackets being provided for housing the bearings where necessary. Two brackets serve to hold in a position the lay-shaft, which runs on ball bearings, the direct or worm shaft having a spigot roller bearing at its forward end, while the rear end has a ball journal for its support combined with double-thrust bearings. The constant-mesh pinion of the propeller shaft is mounted on a Sefko bearing, held in position by a steel casting.

Three forward speeds are provided, giving ratios respectively of 3 $\frac{1}{2}$ to 1 on top, which is a direct drive, 7 to 1 on second, and 12 $\frac{1}{2}$ to 1 on third. There is also a reverse.

The differential cage which carries the worm-wheel runs on large ball races fitted into substantial pressed-steel faces. An oil sump, divided into compartments and cast on one with the axle casings, incloses a layshaft and worm gear. Each compartment is fitted with an oil filler placed in an accessible position. The axle shafts are splined and not square. The rear-wheel brakes, fitted into the hubs, work on the expanding-shoe principle and are well protected from road grit.

There is nothing very new to be noted in regard to the 1914 Morgans. One of the most interesting features of this three-wheeler is, of course, the tubular frame. The exhaust pipes are actually two of the frame members. The independent springing of each wheel is a novel point.

The Wall cyclecar has three wheels only, the single steering wheel being in front. The frame is unsprung and is made of tubing, the front wheel is however insulated to some extent by means of spring forks. The body is suspended on long C-springs. Either of two engines can be fitted, viz., a single-cylinder engine 89 by 96 or a twin-cylinder engine, 85 by 85. Each of the engines is air-cooled. All the gears are contained in an aluminum case bolted to the crankcase. Planetary gears for the main drive, a reduction gear from engine to the planetary gearset, bevel gears to drive the magneto, and a 4 $\frac{1}{2}$ to 1 gear for starting the engine are all contained in this housing. The planetary gearset mechanism gives ratios of 6 $\frac{1}{2}$ to 1 and 11 to 1. A reverse can be fitted if required, but is not necessary as the extremely large lock given by the single steering wheel makes turning, in even a fairly narrow road, a matter of great ease.

Transmission to the rear wheels from the gearbox is by an inclosed shaft and bevel gears. A differential is necessary, since the machine is often turned in a very small circle. The steering mechanism is made in two distinct patterns: either direct tiller or nut-and-screw, with a wheel on the steering column.

New Water-Cooled Humberette

The new water-cooled Humberette model is particularly interesting, as it is practically identical with the air cooled, except as regards the engine. The engine is 84 millimeters by 90 millimeters on both models, giving a capacity of 998 cubic centimeters. In the air-cooled model a large number of thin deep fins are provided to assist in the cooling, air scoops formed in the bonnet assist.

In the other model thermo-syphon circulation through a cellular radiator is used, the cylinders having separate inlets but a common outlet for the casing. With these exceptions the mechanical features are identical. A three-speed-reverse gearbox is bolted up to the crankcase, the flywheel and leather cone clutch being thus partially inclosed. Behind the gearbox is a single joint, coupling through an enclosed propeller shaft to the bevel-driven axle, which incorporates a differential.

The suspension is of interest, as a single transverse half-elliptic is employed in front, and quarter-elliptics in rear.

The Swift company has adopted a pressed steel frame in place of the tubular one, and the front axle is of H-section instead of the original tubular one. The steering has been entirely altered, a worm-and-segment replacing the old rack-and-pinion. The steering spindle, neck and arm, are now all stamped out in one piece while a compensating rod with cushion springs is fitted.

The gearbox has been moved rearwards, so as to bring it into line with the gate. This is a decided improvement, as the operating mechanism is simplified, and no long connecting rods are required.

The propeller shaft has two universal joints, and is not inclosed in a torque tube, the rear springs being depended upon to take the torque from the bevels. The front universal is of the plunger type, and a leather ring joint is fitted at the rear.

The engine is the same as that fitted last season and has twin cylinders 75 by 110. Thermo-syphon cooling is adopted and the magneto is mounted at the front end of the engine and is driven by skew gearing. The gearbox provides three forward speeds and reverse and the gears are actuated by a gate change and are mounted upon a castellated shaft which is not always the case in a low-priced car. The design of the back axle does not differ mate-

rially from that employed last year, the sleeves have been strengthened somewhat— $\frac{1}{4}$ -inch having been added to their diameter. All the wheels run on ball bearings.

There is a peculiarity in the design of the body: the seats are staggered, the driver's seat being a few inches in front of that of the other occupants of the car. With this arrangement the driver is able to approach his seat without disturbing the passenger. The wheelbase is 87 inches and the tread 43 inches.

There are two models of Marshall Arter light cars, viz., 10-12 and 12-14 horsepower, and the two are identical with the exception of a slight difference in the engine sizes. The 10-12 dimensions are 59 by 100 and 12-14 dimensions are 60 by 110. The cylinder castings are identical, the larger bore being obtained by boring out the castings a trifle more. The first mentioned is within the limits of the cyclecar definition. Both are the very latest type, with forced lubrication. The crankshaft is drilled so that the bottom ends are lubricated in this manner and not on the splash system. A horizontal Zenith carbureter and Bosch magneto, capable of being advanced or retarded by swinging about its axis, are fitted.

The engines are of the Chapinis-Dornier make and have inclosed valves with adjustable tappets. The clutch is a leather-faced cone.

In the spring drive the ends of a tempered steel bar twist relatively to one another when the power is applied to the driving end, so that this bar absorbs the engine impulses and transmits a more constant torque to the driving mechanism. The steel bar is capable of bending in one direction and swiveling in the other, which allows it to conform to the whip of the chassis. It is incased in a light steel tube and so kept laterally rigid by means of semi-circular wood blocks placed in the middle of the tube.

Facts About the Wolseley

The Wolseley stellite car, rated at 9.506 horsepower, has four cylinders, 2 $\frac{7}{16}$ by 3 $\frac{1}{2}$ inches, with a normal crankshaft speed of 1600 revolutions per minute. The cylinders are cast in block, but with separate heads in one casting, and this latter attached to the cylinder by eight studs. This arrangement, although it introduces two additional surfaces that have to be milled, yet brings about a cheaper construction generally.

The boring and grinding of the cylinder barrels is also much facilitated. The exhaust valves are in pockets whereas the inlet valves are over the pistons; these latter valves are in cages and are operated by rocking levers, and vertical push rods—all the valves being worked from a single camshaft. The inlet valve cages are screwed into place and to remove them for grinding or examination it is necessary to remove the short rocking arms operating the valves.

The exhaust manifold is ribbed and is held against the cylinder casting by six studs. A Bosch high-tension magneto with fixed timing is fitted. The ignition plugs are set at an angle immediately over the exhaust valves. The water outlet for the thermo-syphon system is cast with the cylinder head casting, but the intake is a separate casting and serves to cover a large square opening in the water-jacket, the opening being necessary for the removal of the core.

The crankcase has no horizontal division, the crankshaft being inserted from one end of the casing. On the flywheel end of the base chamber is an oil pump, and this draws oil from a large rectangular sump and delivers it to the crankshaft bearings.

The clutch is a leather cone and the clutch shaft rests in bearings that are fixed to the crankcase. In this way the engine and the clutch together with its operating gear form a unit. Behind the clutch is a universal coupling. The brake pedal is mounted upon the clutch shaft and this brake has a compensating device on the wire rope system.

The gearset gives two speeds and reverse, is mounted upon the axle, and the final reduction to the axle is by worm.

Worm and Wheel Ratio

The worm-and-wheel ratio is 7 to 38 and at normal engine speed the first speed gives 9 $\frac{1}{2}$ miles per hour, and the second 24 miles per hour. The reverse gives 8 $\frac{1}{2}$ miles per hour. The range of speed on the top gear is pretty considerable, being from 8 to 35 miles per hour. There is an inspection door at the back end of the axle casing. The design of the axle casing and that of the gearbox is very neat and there is an absence of webs and projections. The back axle, gearbox, torque tube, quarter-elliptic springs, brakes and spring brackets form a complete and easily detachable unit.

Two independent internal enclosed brakes are fitted and both are arranged in drums upon the back wheels. The front axle is on the same unit system as the back axle, the whole axle with its coupling rod, quarter-elliptic springs and spring brackets being readily detached. Both brakes are actuated by steel member at the rear end while at the front end the engine bearers are chiefly relied upon for stiffening the frame.

Car Makers Keep Watch of Progress in Road Work

Interesting Report Made by Automobile Chamber of Commerce

NEW YORK, Dec. 15—The Automobile Chamber of Commerce, the car manufacturers' national organization, is keeping close watch on the good roads situation and through its commercial and good roads committee, of which H. W. Perry is secretary, it has the following to report:

Evidences increase that the need of more durable roads is beginning to be better appreciated by highway authorities. Commissioner Carlisle, of the New York state highway commission, issued an announcement at Albany early in December that his plans for future work contemplate the construction of a largely increased mileage of brick and concrete roads; that where traffic is heavy the cement concrete type of roads, as built around Detroit, will come into more general use, and that where traffic is very heavy brick will be used.

In order to lessen the cost of brick, on which transportation charges are heavy when they have to be hauled long distances from other states, it is proposed to establish a brick-making plant, to be operated by state convicts. A change in the maintenance system for macadam and bituminous roads also is contemplated. This consists in substituting for the present inefficient patrol system a gang system, each of the nine divisions of the state road system maintaining a repair crew provided with a portable repair outfit. This outfit consists of a motor truck or tractor designed especially to carry all the necessary equipment for making extensive repairs to bituminous macadam, as well as to water bound macadam roads. Although designed for a speed of 15 miles an hour, the truck can be used as a road roller.

Engineers to Study Problems

Another project of the commissioner is to assign a competent engineer to constantly investigate and study the most advanced methods and materials for road building in the different states, to insure that the many millions of dollars voted for highway improvement in New York are expended most judiciously.

Following on the heels of the commissioner's announcement came a report that a special committee of the state department of efficiency and economy had drafted a new set of highway specifications at the direction of the governor. As officially announced, the purpose of these is to bring about open competition in the supply of road materials and to eliminate road building methods that are patented.

Under the new specifications all roads will be 8 inches thick and all but the water-bound macadam will have a foundation of 6 inches of cement-concrete, with a 2-inch wearing surface of other material. Only five kinds of roads are provided for. These are water-bound macadam, two kinds

of bituminous macadam, brick and stone block. It is recommended that all stone and asphalt be mixed before laying and that hot oil treatment by the penetration method be abandoned. Brick and stone block pavements will have a 6-inch concrete foundation and a $\frac{1}{2}$ -inch sand cushion. All materials used must be shown to have stood 2 years of actual use.

It is reasonably certain that if these specifications are put into practice and if the highway commissioner is allowed to carry out his announced intentions, New York state will in the course of a few years have a much larger mileage of roads that will be suitable for motor traffic and that will sustain the weight of motor trucks without injury to the road surfaces or foundations.

Cement-Concrete in East

Although much progress has been made in the middle west and far west in the building of cement-concrete roads, the east has only begun to experiment with this type. According to reports from some of the cement companies, about 4 miles of concrete road are soon to be built near Albany, and several miles will be built in Bergen county, N. J., on the Tea Neck and Fort Lee turnpikes.

Numerous short pieces of experimental concrete road have been built in New Jersey, or are practically certain to be built in 1914. These are located at Glen Ridge, South Orange, Palisades Park, Red Bank and a stretch between Morristown and Dover. These are all near New York city and carry a large volume of mixed traffic. They are of the one-course type, like the Wayne county roads around Detroit, with no wearing coat on the surface.

The concrete road is of such comparatively recent origin that there seems to be a great lack of knowledge concerning it, especially regarding the first cost of construction and its durability. It is generally assumed that it costs so much more to build concrete roads than water-bound and bituminous macadam that they are practically prohibited except immediately adjacent to large cities, where the volume of traffic is particularly heavy.

This is a mistake. According to Commissioner Edward N. Hines, chairman of the Wayne county road board, the one-course concrete roads cost about the same as bituminous macadam. This is substantiated by one of the engineers who is directing the construction of the new concrete roads in New Jersey, who says that their cost is less.

Doctor Pritchard, chairman of the good roads committee of the Winona county chamber of commerce, at Winona, Minn., is authority for the statement that 16 miles of concrete roads built in that county cost from \$500 to \$1,000 less per mile than

bids on water-bound macadam roads in the same location. The actual average cost was \$7,260 a mile, for roads having a concrete surface 8 feet wide and 6 inches thick, with 6-foot shoulders of macadam on either side. Traffic is small in volume there so that the 8-foot concrete surface is wide enough so long as there are good shoulders for turning out. The cost quoted includes preparation of the subbase, culverts and all expenses except bridges. The higher bids for all-macadam roads were due to the distance that crushed stone has to be hauled, whereas clean gravel is used for the concrete.

Austin B. Fletcher, state highway engineer for California reports that the California highway commission has adopted for a large portion of the 2,760 miles of trunk highways to be built under an \$18,000,000 bond issue a pavement having a Portland cement concrete base not less than 4 inches thick and 15 feet wide, with 3-foot shoulders on either side. The concrete is covered with a wearing coat of stone screenings and asphaltic oil $\frac{3}{8}$ to $\frac{1}{2}$ -inch thick. No expansion joints are provided but when natural cracks occur, which they usually do at intervals of about 30 feet, they are filled with heavy bituminous material.

Cost in California

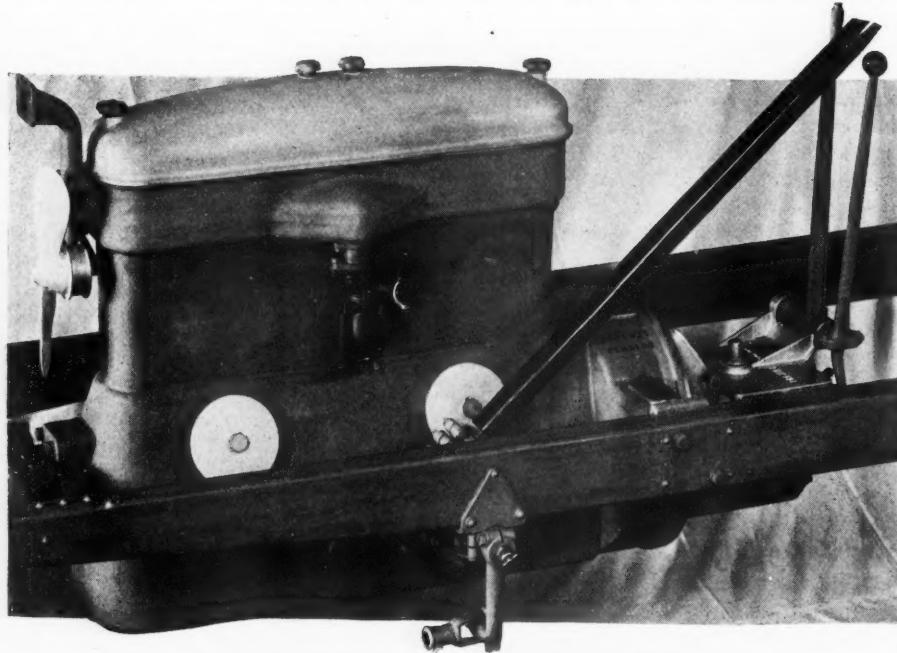
Nearly 200 miles of these roads have been built or contracted for, at an average cost of \$6,394 per mile, exclusive of the cost of grading, culverts and administration. Bituminous macadam roads built by the commission cost \$6,364 per mile and water-bound macadam, \$4,303. Asphalt on a macadam base costs \$8,403 a mile, but roads of this construction are wider, so that the cost per square yard is practically the same as for concrete—71 $\frac{1}{2}$ cents, as compared with 71 $\frac{1}{2}$ cents. Bituminous macadam is 72 $\frac{1}{2}$ cents a yard and ordinary macadam 48 $\frac{1}{2}$ cents.

The report of the Illinois highway commission for the years 1910 to 1912 inclusive gives some interesting data on the cost of construction of macadam and concrete roads, exclusive of contractors' profits, compiled from actual costs of 150 pieces of macadam road and five pieces of concrete road. The costs include shaping the roadbed and trimming the shoulders, figured in all cases at 3 cents per square yard. The construction costs may be compared as follows:

STANDARD 16-FOOT SURFACE

Average haul of crushed stone, gravel and cement, miles.....	1.6
Water-bound macadam, 16 feet wide...	6,269
Bituminous macadam, 16 feet wide...	7,985
Concrete, 10-foot concrete with 6-foot macadam.....	7,982
Concrete, 12-foot concrete with 4-foot macadam.....	8,402
Concrete, 16-foot concrete surface, 6 inches thick.....	10,061
Concrete, 16-foot concrete surface, 7 inches thick.....	11,472

Weidley-Motored Six Premier's Surprise for 1914



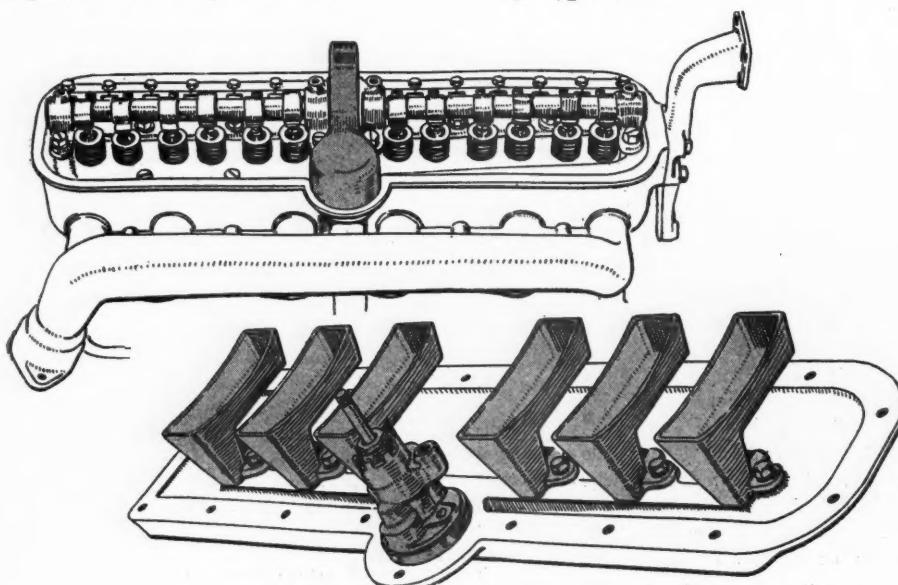
CARBURETER SIDE OF NEW MOTOR OF PREMIER SIX
Clean appearance of the motor and its complete inclosure are striking. The four hand-wheels on the top remove the valve cover

GEORGE A. Weidley's new motor is Premier's answer to the high-cost-of-motoring question. Twenty-three miles per gallon of gasoline on city streets in a touring car with four people up is the record claimed for the new six, whose cylinders are $3\frac{5}{8}$ inches bore and $5\frac{1}{2}$ inches stroke.

This engine is the feature of the new six-cylinder car just announced by the Premier Motor Car Co., Indianapolis, and is a very decided departure from engine design in America. It is an addition to the present Premier line, the 6-60 and 6-40 being continued. It is called the Weidley motor, for its designer, who is the chief engineer of the Hoosier concern.

FEATURES OF NEW PREMIER SIX

*Valves located in cylinder head
 Single camshaft above valves
 Valve mechanism very light
 Camshaft driven by vertical shaft and worm gears
 All valve parts operate in oil
 Six cylinders cast in block
 Bore, $3\frac{5}{8}$ inches; stroke, $5\frac{1}{2}$ inches
 Wheelbase, 132 inches; tires, 36 by $4\frac{1}{2}$ inches*



TWO FEATURES OF THE WEIDLEY MOTOR

Above—The cylinder head carrying the valves, camshaft and entire valve mechanism. Below—the oil troughs on a removable bottom plate and the ditches by which the oil is returned to the pump

Engine Has Valves in Head with Overhead Camshaft

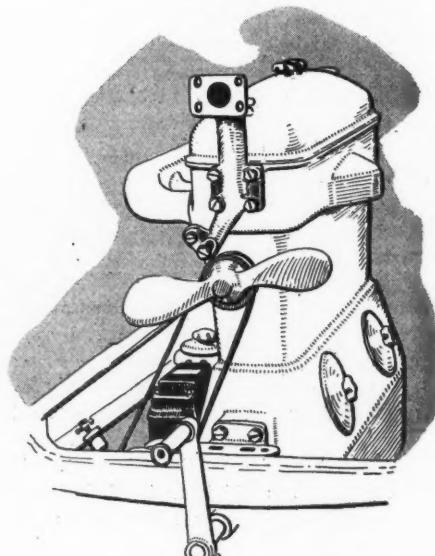
Contrary to numerous rumors which have been in circulation, the Weidley motor is of the poppet-valve type; but these valves are all in the head, without cages, and are operated by a single camshaft which lies above the cylinders. The overhead camshaft is driven from the crankshaft by a vertical shaft through worm gears, or rather, helical gears at right angles; and the whole mechanism—shafting, gears, camshaft and valves—is enclosed completely and copiously lubricated.

Another Maintenance Angle

Premier policy heretofore has been directed mostly toward that construction which makes for easy maintenance for the owner—small parts subjected to wear have been designed for quick and cheap replacement and accessibility for adjustment was made prominent. With the reputation thus gained the company now attacks another angle of the owner's problem and with admirable foresight takes up the other and increasingly perplexing phase of the maintenance question, the fuel cost.

Eighteen months ago, H. O. Smith, president of the Premier company attended a meeting in New York of the A. L. A. M. Among the chief subjects of discussion was the threatened effect on the industry of the rapidly increasing cost of gasoline. So serious did the manufacturers consider this problem that a committee was formed to consider steps toward fuel cost reduction. Upon his return to Indianapolis, President Smith had a conference with his engineer and a conversation something like this took place:

"Weidley, I believe we manufacturers have 'the wrong pig by the ear' when we



FORWARD END OF THE NEW SIX
Note that the casting carrying the fan is also the upper water connection to the radiator

turn the most of our efforts toward lowering the price of fuel. Of course, we are all trying to get better efficiency and are getting a little better every year. But can't we make some definite step in that direction that really counts?"

"I have been working on that same idea for a long time," said Weidley, "and I have on my drawing table the design of a new engine that ought to work out very economically. It is a valve-in-the-head engine."

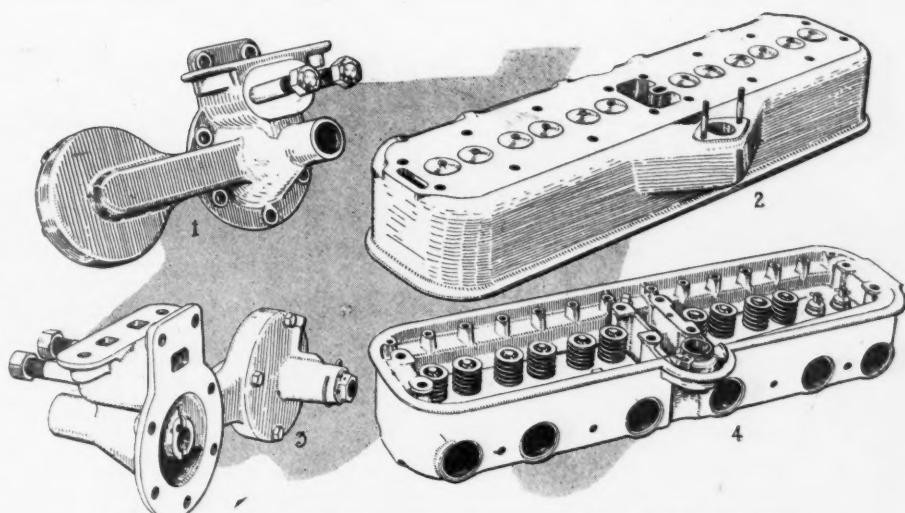
"But we had a valve-in-the-head motor years ago and discarded it," returned Smith.

"Yes, but if this works out the way I think it will it won't be noisy and the push rods won't always be getting out of adjustment."

How It Came About

Then Weidley outlined his plans to president Smith who gave the engineer carte blanche to develop the idea.

With that painstaking finesse of mechanical precision inherited from generations of watch-making Swiss ancestors in Zurich, Weidley perfected his designs and the new Premier six is the result. With gasoline economy as the aim, Weidley designed his new motor with valves in the head, which arrangement generally is credited with being the most efficient, at the same time he got away from the chief objections to the valve-in-head construction, those of expansion and weight of long push rods and rocker arms, by locating the camshaft right over the valves. He got away from another objection, that of noise, by putting a cover over the whole mechanism, and



SOME OF THE MULTI-FUNCTION PARTS OF NEW WEIDLEY MOTOR

1 and 2—Front and rear views of the water pump casting, which is pump, lower radiator connection and support, front motor support, starting crank bracket, and crank-shaft thrust adjustment housing

3 and 4—Bottom and top of cylinder head casting with camshaft removed

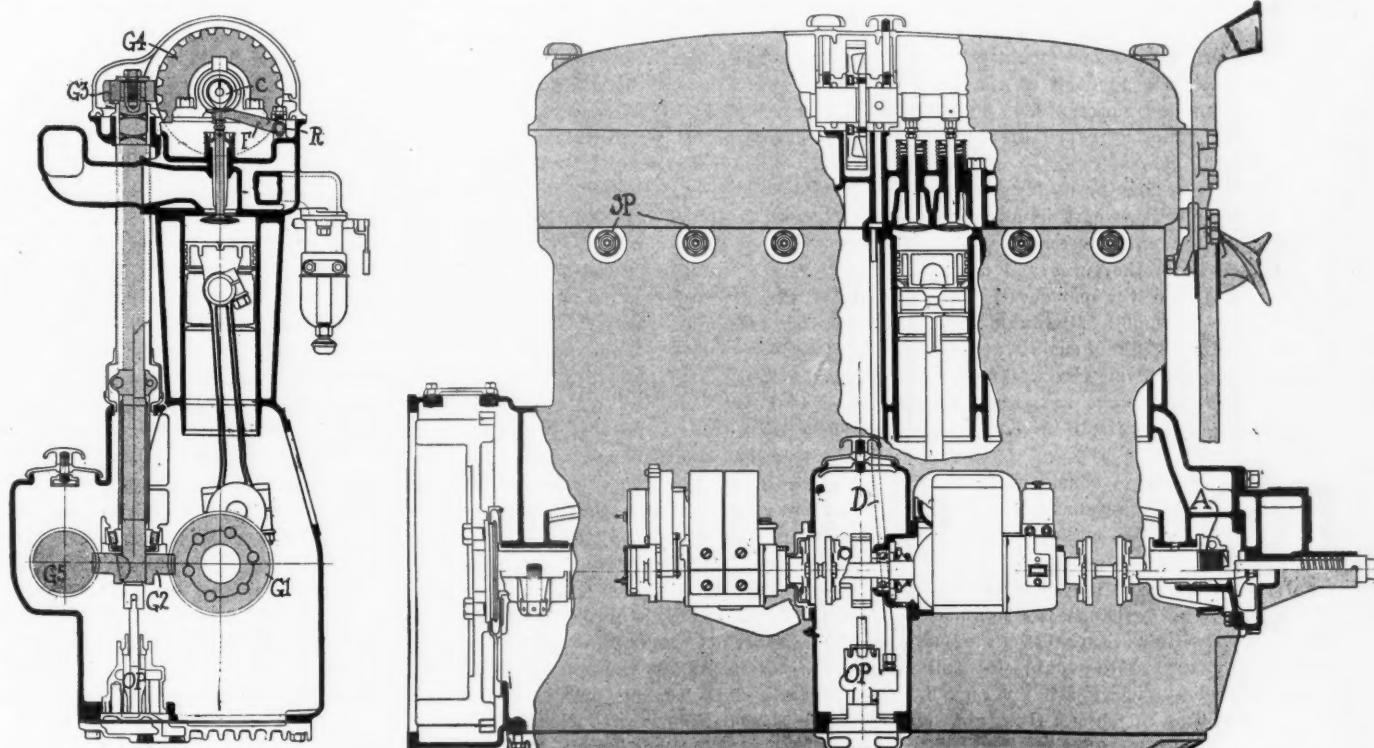
then provided against wear in the outfit by shooting oil to every place where two surfaces rub together. Incidentally, it may be taken for granted that Weidley did not overlook the easy maintenance feature of Premier productions which made the Premier owners' ocean-to-ocean tour possible. How he did this will be developed later.

But when Weidley planned his new motor for efficiency and silence above all, he builded better than he knew, although it is doubtful if he will admit it. When the motor was tried out, it showed unexpected capabilities of power and speed and flexibility. As to speed, a test on the motor

speedway developed 70 miles per hour with three people up, but when they took the Motor Age man out for a run on Millersville Pike through rolling country, a favorite testing ground for the motor car makers of the Hoosier Metropolis, the new car exhibited a more important characteristic than that of speed.

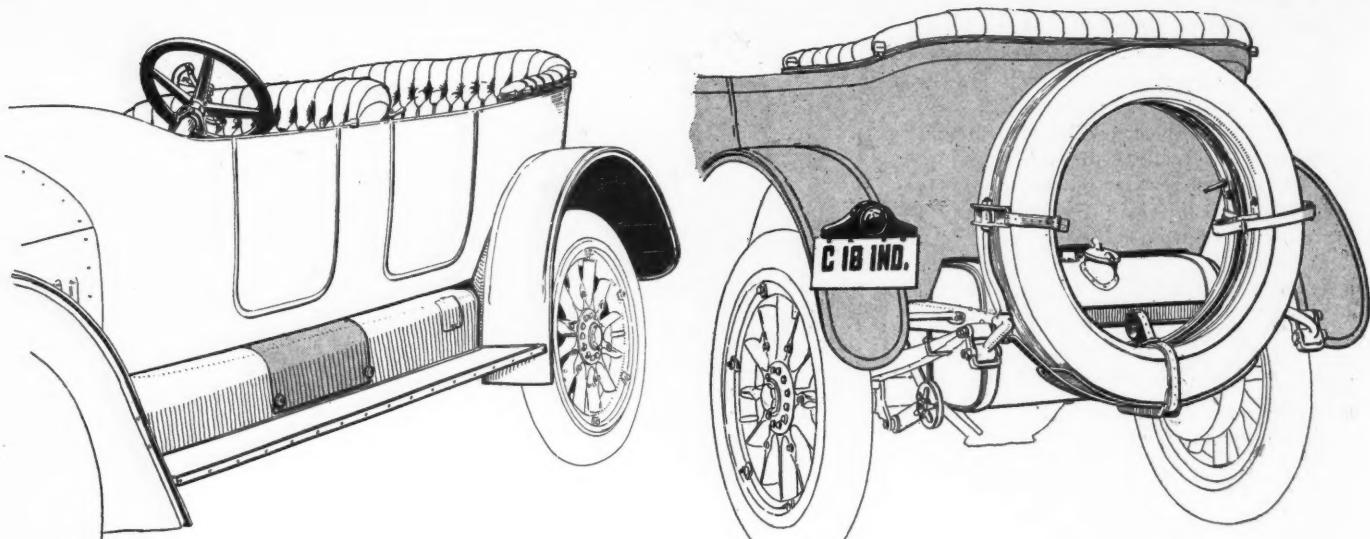
Motor a Hill-Climber

Johnson's hill, by which the climbing abilities of all the local maker's products are gauged, and the negotiation of which without gearshifting is considered a feat, was selected as the testing ground. The speedometer registered 18 miles per hour



THE NEW WEIDLEY ENGINE IN SECTION SHOWING VALVE OPERATION AND OILING

Gear G1 on crankshaft meshes with G2 on vertical shaft and G3 drives G4 on the camshaft. Cam C presses on finger F which is pivoted at R and opens valve downward. SP are the spark plugs in the side, OP the oil pump, D is the oil lead to the cylinder head and A is the adjustment by which end play in the crankshaft may be taken up



LOCATION OF BATTERY IN NEW PREMIER SIX APRON

The cranking and lighting accumulator is carried in the apron, where it is out of the way and still accessible. Fenders are not attached to running boards

at the bottom, 22 at the middle and 18 at the top—on high speed all the way. Acceleration on the levels seemed exceptionally good, the car picking up with a steadily increasing speed that conveyed a unique impression of steam-engine-like smoothness.

On another climb that taxed the larger motors of the present Premiers on high speed, the new motor held the speedometer at 20 every foot of the way from the bottom to the top with a steadfastness that caused some anxiety as to whether the speedometer was stuck.

Although geared for lower engine speed than its older namesakes, the new engine is capable of higher r.p.m. In fact, were it not for the nameplate one would take it from its appearance for one of the new European high-speed motors. The smooth exterior of the motor is the first thing that strikes the eye.

Details of Weidley Engine

The six cylinders are cast in one block together with the entire crankcase. The cylinder head is another unit and carries all the valves and the camshaft, while covering it is a smooth aluminum plate that makes an oiltight housing for the valve mechanism. Even the water pipes have been eliminated, the radiator being bolted to the motor itself without any rubber connections.

The valves are large, considering their location in the head; they have an outside diameter of 1 15-16 inch and a clear opening of 1 21-32 inch. There are no cages, the valves seating right in the head casting. Each valve overhangs the cylinder bore slightly, so that in the event of a stem breaking the valve would not fall into the cylinder. There are no rocker arms used, the camshaft being right above the ends of the valve stems; but between the cams and the stem ends is the end of a very light steel finger pivoted its other end. This carries the adjustment by which

wear can be taken up and replaces the usual valve-stem adjustment.

Valves and fingers are so much lighter than the ordinary long-stemmed valves and their tappets that the valve springs are 20 pounds weaker than usual. This means less wear and less noise. In fact, silence of the valve mechanism is one of the first subjects of comment; at 50 miles per hour with the muffler closed, there was none of the clatter that characterizes many motors. At 4 m.p.h. on high the silky silence of the cylinders caused one unmechanical passenger to suggest that the engine had "gone out." The finger arrangements does away with all side thrust on the valve stems. The aluminum cover plate is held on by four small hand wheels.

Among the motor details which show interesting design is the oiling system. It is a combination of pressure and splash cared for by a gear pump bolted to the crankcase and driven from the bottom of the vertical shaft. The oil is distributed by a rotating sleeve on the top of the pump. Equal parts of the oil are sent to each of the six troughs into which the connecting rods dip, through a passage bored in the bottom plate and one-seventh to a vertical passage connecting with the valve mechanism. In each of the splash troughs a drilled plug is inserted where the oil enters so that the system is under pressure at all times and the front cylinder gets as much splash as the others on a hill. The vertical pipe connects with the center camshaft bearings and oil reaches the shaft through those.

The camshaft is drilled through its whole length and there are cross holes through the shaft at the cams and at the end bearings. One of the middle bearings has a groove around its inner periphery with which a hole in the camshaft registers. A small stream of oil squirts out from the back of each cam and flows over each finger. The oil then drains toward the center of the cylinder

REAR OF THE NEW PREMIER SIX TOURING BODIES

Illustrating the disposition of the fuel tank half above the frame, the body cut away to receive it. Tire holder is bolted to frame member

head and falls back to the crankcase through a hole in the casting. In the center of the cylinder head casting is a well in which the camshaft gear revolves and the oil from the camshaft bearings keeps this filled so that the gear turns in bath of oil, as does the gear on the vertical shaft and its bearing.

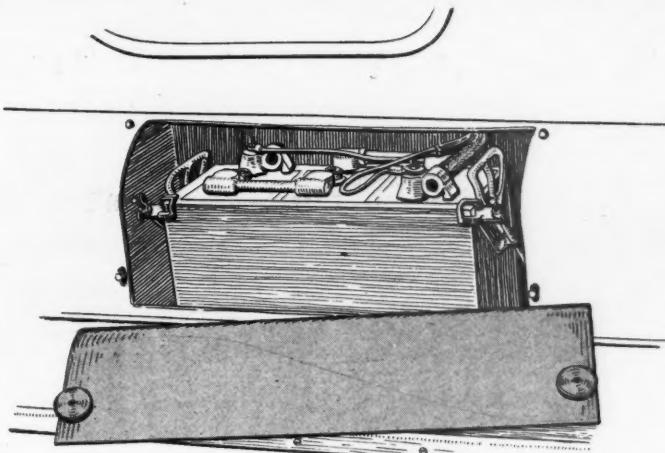
On its way to the crankcase the oil falling from the top of the motor strikes the gear in the middle of the crankshaft, also filling the two middle bearings next to the gear. Troughs on the sides of the crankcase lead the splashed oil to the end crankshaft bearings. Leakage at the end bearing is prevented by a thrower ring and troughs in the flywheel housing. The crankshaft has four bearings, though with a three-bearing simplicity; the two middle bearings both being between the third and fourth cylinders.

The Remy starting and lighting generator, the Eisemann magneto and the water pump are driven by a gear like that on the crankshaft, but located outside the vertical shaft gear so that these instruments are parallel to and on a level with the crankshaft. Mounted on the pump is a pulley for the fan belt.

Multi-Function Castings

One of the ideas of design throughout the motor is the small number of parts, obtained by making one have a number of distinct functions. An instance of this is the water pump, the casting with which it is incorporated serving a number of purposes. It forms the pump housing, the water connection from radiator to pump, the connection from pump to motor, the starting crank bearing, the radiator support, front motor support, and holds the adjustable thrust-bearing at the front end of the crankshaft.

The upper water connection likewise is a multi-function part. This casting has a downward projection which supports the fan and provides an adjustment for the



DETAIL OF PREMIER BATTERY BOX

Battery is set on special base which drains to ground, and is held in place by diagonal fastener at the upper front corners

fan belt tension. The radiator is supported only by the top and bottom water connections, and there is no rubber hose. The radiator thus has a two-point support and is a unit with the motor so that it is not affected by twisting of the frame. The fan is the two-bladed aeroplane propeller type.

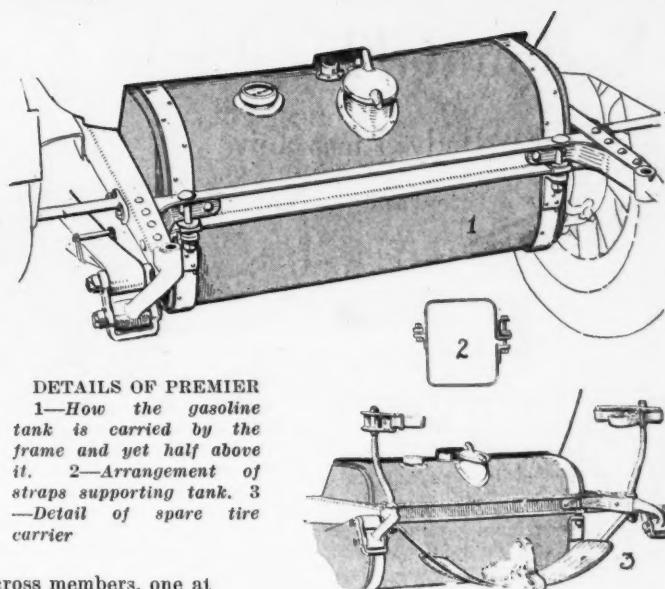
Divided Pistons Used

Weidley employs a unique type of pistons in this motor, and calls them cross-head pistons. They are so designed that the part taking the pressure of the gas is separate from that which serves as a guide. Piston head and ring grooves are formed as usual, but there is a slot $\frac{1}{4}$ inch wide between the head and the skirt. The bosses are linked to the head by two crescent-shaped webs. Thus no heat is transmitted from the head to the skirt and the head proper is kept cooler. The form permits very small clearance on the skirt, .0015 inch, so that there is no chance of piston slap.

The Remy cranking motor is carried behind the rear motor arm, a sliding gear meshing with the flywheel gear for starting.

Premier precedent is shattered in another respect. This is in the unification of the power plant in the new design. In this the factory has gone beyond the practice of the strongest supporters of the unit power plant in making it complete by the incorporation of the radiator as a part of the unit. The essentials of the rest of the chassis do not differ greatly from previous Premier construction. The multiple disk clutch is continued. The gearset is a three-speed one with the control levers in the center and the driver on the left as formerly.

The rest of the chassis is unchanged except the springs and frame. Rear springs on the new car are semi-elliptic instead of three-fourths to reduce sidesway. The side members of the frame are straight, except for a upkick over the rear axle, but there is no necking in. However, the frame is tapered, the width at the front being 6 inches less than at the rear.



DETAILS OF PREMIER

1—How the gasoline tank is carried by the frame and yet half above it. 2—Arrangement of straps supporting tank. 3—Detail of spare tire carrier

There are only three cross members, one at the front of the motor, one in front of the rear springs, and another at the extreme rear. But the rear arms of the motor form a most substantial brace for the frame.

The fuel tank is at the rear instead of under the seat. This tank is nearly half above the frame and the rear of the body cut away to fit it. Mud guards follow the contour of the wheels and are narrower than formerly, and to eliminate squeaks are not fastened to the running boards. The battery is hidden under the left apron where it is accessible.

The hood is remarkably short for a six, misleadingly so in fact, for no one would recognize the motor for a six from the appearance of the bonnet. The latter has a very decided taper to the pointed radiator. The whole body has very smooth lines and the sides are particularly high. The wheelbase is 132 inches, tires are 36 by $4\frac{1}{2}$. Four and five-passenger bodies are under way now and seven and two-passenger later.

TRUCK MAKERS ENJOINED

Walkerville, Ont., Dec. 15—The Gramm Motor Truck Co. of Canada announces that the supreme court of Ontario has issued an injunction restraining the Fisher Motor Co. of this city from using the name Gramm-Bernstein, Gramm or in fact the name Gramm in any form until the suit brought by the Gramm Motor Truck Co. of Canada is heard. The Fisher company is charged with having announced its intention to make trucks in Walkerville and market them in Canada under the name of Gramm.

RAJAH ENJOINS REX

New York, Dec. 12—The Rex Ignition Mfg. Co. is perpetually enjoined and restrained from substituting in a Rajah spark plug any part not sold by the Rajah company. On November 19 Circuit Judge Ward of the United States court of appeals rendered an opinion in the suit of these two companies, sustaining the valid-

ity of the Rajah company's restricted license under which its plugs are sold. They are sold under a license restriction that no porcelain or other part not made by the Rajah company shall be substituted in the plugs of that make. Various dealers have contended that this restriction was not enforceable. The opinion by Judge Ward not only sustained the validity of the Rajah restriction, but held that it was contributory infringement of the Mills patent No. 825,856 to sell porcelains for substitution in the Rajah plugs, unless these porcelains were made by the Rajah company. A preliminary injunction was granted. Judge Holt now has given a full injunction against the Rex Ignition Co.

TIRE COMPANY BANKRUPT

Springfield, O., Dec. 15—A voluntary petition in bankruptcy was filed in the United States court at Cincinnati recently by the Springfield Tire and Rubber Co. According to the petition the assets are estimated at \$8,441.94 and the liabilities at \$15,223.02. The Citizens' National Bank of Springfield is given as the largest creditor with a claim of \$5,707.25. There are a number of other large unsecured creditors.

STEWART TO MAKE SEEK REGULATOR

Chicago, Dec. 16—The Stewart-Warner Corp. has taken over the patents of the Seek Regulator, a device which automatically varies the proportions of air and fuel in a carburetor with variations in temperature of the motor. Thus, a motor when cold needs a richer mixture than when it is warmed up and the Seek regulator is intended to maintain the proportions required for most efficient running. This device is the invention of J. H. Seek and has been described in these columns under the name of the Seekostat. It is expected that the Stewart-Warner Corp. will manufacture these in quantities for installation to new cars and those already in service.

National Has Light Six With Cantilever Springs

Boat-Like Body Lines Give Speedy Appearance—New Engine Is L-Head Block Casting

After several months of rumors as to the appearance of a six-cylinder car at less than \$2,500 from the National Motor Vehicle Co.'s factory in Indianapolis, these are confirmed by the announcement this week of the new National six. This is of the conventional cylinder dimensions of $3\frac{3}{4}$ -inch bore and $5\frac{1}{2}$ -inch stroke. Also, like many of the new sixes, this latest one has its cylinders cast in a single block and these are of the L-head type, both intake and exhaust valves being on the right-hand side of the engine.

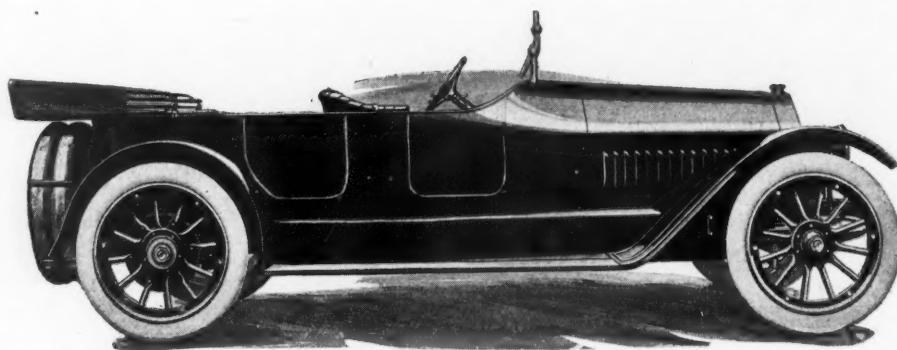
In both respects, that of the method of casting the cylinders and that of their shape, the new six differs from former National practice. Model 40, the sole chassis model which has carried the National flag for the past year and the one which probably will be the chief factor in the company's production program

for the future, has its cylinders cast in pairs and these are of the T-head type, employing two camshafts with the valve on either side of the cylinder.

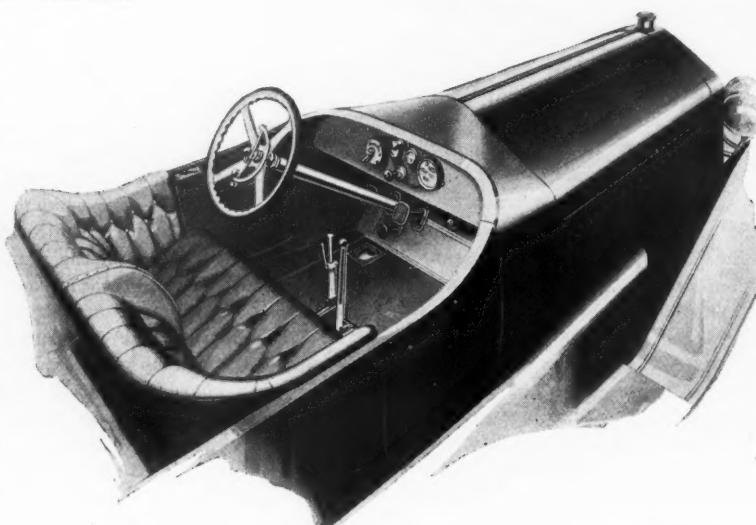
National Selling Policy

In its selling policy as well as the mechanical features, the National company has adopted a rather unusual method. It is the belief of George M. Dickson, general manager of the company that the prospect is more vitally concerned in the character of the maker and the responsibility than with many of the minor details—that it is sufficient to show the buyer that the factory has the kind of a car he wants and the responsibility of the factory and the good judgment of its engineers may be relied upon to provide the proper material to make it stay that way. His idea is that buying a car is much like buying a high grade watch—the maker's name is sufficient guarantee of its proper material and design.

Not only in its entry to the six-cylinder ranks does the new car prove an innovation for the National; it is remarkable also for the exceptional sweep and cleanliness of its body lines. Probably the body on this new six approaches as nearly to the so-called streamline type as any so far



NATIONAL'S NEW SIX IN TOURING CAR FORM. LINES OF THE HOOD ARE SMOOTH



FORWARD PORTION OF NEW SIX BODY TAPERS FROM REAR TO RADIATOR

entered on the American market. The hood tapers from the radiator back without a break; the taper seemingly beginning as far back as the front seat. It gives one the impression of the speedy motor boat.

A third innovation and one almost as radical as the adoption of the sextuple engine is the cantilever type of rear spring suspension which is employed. This is somewhat similar to the Lanchester suspension, but differs from the latter in that the entire thrust of the car is taken

FEATURES OF NATIONAL SIX

*L-head cylinders, cast in block
Bore $3\frac{3}{4}$ inches; stroke $5\frac{1}{2}$ inches*

Waterjacketed intake

Cantilever rear springs

Exceptionally smooth body lines

Wheelbase 132 inches

Tires $36 \times 4\frac{1}{2}$ inches

Silent chain starter drive enclosed in timing gear housing

Coupe of novel line at \$2,850

Four and five-passenger cars at \$2,375.

Radiator efficiency improved

through these springs. This probably is the first attempt to use a cantilever spring as the propulsive member. The cantilever spring, by the way, is not the novelty in the way of suspension systems that it is generally supposed to be. There is in the Vatican in Rome a horse-drawn vehicle of a vintage 70 years ago, in which this same type of spring is employed. National springs are 53 inches long and hung at the front end from a double shackle.

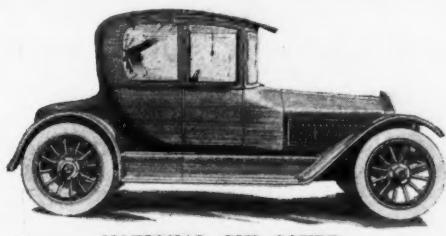
Now that the most striking of the features of the new car have been brought out we can return to a more logical discussion of it. The motor, whose cylinder

bore gives it a rating of 33.75 horsepower, transmits its power through a cone clutch with a three-speed gear-set located amidships of the frame. An uninclosed propeller shaft with a universal at either end carries the power to the floating axle and a large torque arm takes up the twisting action. The car is 132 inches between wheel centers and tires are 36 by $4\frac{1}{2}$ inches. The steering wheel is located on the left side, while the control levers are in the center and placed well back toward the seat, where they are the least in the way.

Motor Has Clean Appearance

In conjunction with the block cylinder casting is used a detachable intake water header, while both intake and exhaust manifolds likewise are detachable. The exhaust manifold is a square, clean casting, which helps to give the whole carburetor side of the motor a clean appearance. The intake manifold is waterjacketed, to improve the vaporization of the present low grade fuels.

In the cooling system there are some special features. The radiator of National design has been improved in efficiency somewhat, so that it can be made slightly smaller, and thus assist in obtaining the



NATIONAL SIX COUPE

smart slope to the hood. The radiator is mounted upon trunnions on the frame horns to prevent damage from twists, due to road inequalities. The cooler is assisted by an adjustable ball-bearing fan mounted on a standard from the engine base. On the fan pillar is provided an adjustment for keeping the belt tension.

Details of Six Motor

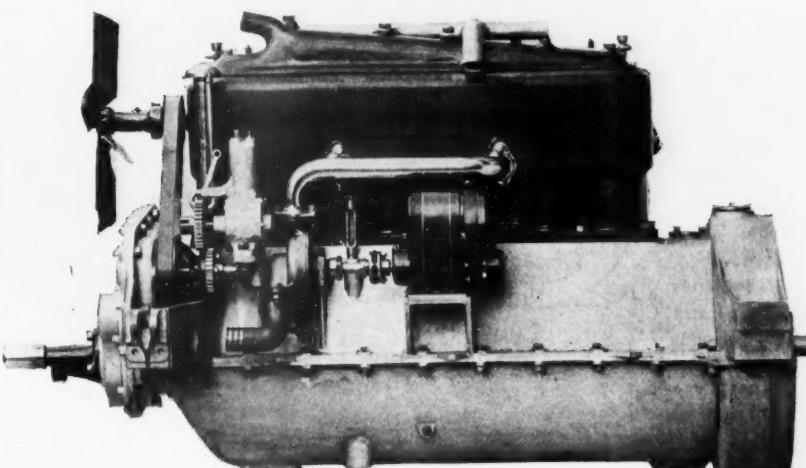
The circulation of water is carried on by a rotary pump on a lay shaft driven from the timing gears. These are spiral-cut and operate in a bath of oil. The lay shaft carries in turn from front to rear of the motor a fan-belt pulley, the tire pump, water-pump and lastly, through a flexible leather coupling, the magneto. The crank-case is divided horizontally and the combination of splash and force-feed pump keeps a constant level, into which the connecting rods splash for cylinder lubrication and the main bearings are oiled through tubes cored into the casting. These tubes also lead oil to the forward end of the motor for the timing gears and for the lubrication of the silent chain, which runs in a bath of oil to drive the Deaco electric generator and cranking motor. The latter, though separate units, are mounted as a single piece upon the valve side of the motor, and at its forward end. The silent chain is of unusual breadth running to the crankshaft. The method of mounting the electric units for which a special base-plate is cast on the engine, makes the apparatus almost a part of the engine, so that it does not give the impression of being an after-thought. The cranking unit is thrown into action by a small foot plunger, while the electric generator action is automatic.

Ignition is obtained by a high-tension magneto of the dual type, which is driven from the lay shaft. The Rayfield carbureter is fed by pressure from a 21-gallon tank hung at the rear end of the frame. This pressure is maintained by a small piston-type pump operated by a special cam on the cam shaft.

Within the flywheel is the aluminum cone clutch, with a leather face which is spring-cushioned, to give gradual and easy engagement. The clutch is removable

without disturbing the rest of the transmission. This feature is obtained by the employment of a double universal in the short shaft between the clutch and gearset, and is one of the time tried features of National construction. The clutch pedal is adjustable to give slight variations in the action and spinning is prevented by a clutch brake consisting of two pads which bear on the rim.

The braking system includes two internal expanding hub brakes and two external contracting brakes on the outside of the drum. These drums are 16 inches in diameter. The frame is particularly sturdy in construction. It is 5-inch channel section, with exceptionally wide flanges, curved up over the rear axle to permit low body suspension. The frame is offset in front to permit turning in a small circle, and it is stated the car can be turned around in a 39-foot circle. The 22-gallon gasoline tank is set flush with the top of



NEW BLOCK L-HEAD SIX OF NATIONAL TIRE PUMP MOUNTED ON BRACKET INTEGRAL WITH MOTOR

the frame, so that it becomes almost a unit with the body, while it is carried upon the more stable portion of the chassis. The front axle has large adjustable roller-bearings in the hubs, and the rear axle likewise is of the roller bearing type. The mud-guards are exceptionally wide and are perfectly smooth and flat, having neither beading nor doming.

National Control Features

The control features consist of an instrument board in the cowl, upon which are grouped the switches and indicators, all within a metal plate. A dash control of the carburetor is provided. The electric horn button is carried in the top of the steering column, where it may be quickly sounded. The bodies fitted upon the new six-cylinder chassis include a four-passenger and a five-passenger touring,

and a three-passenger coupe. The touring cars are listed at \$2,375, and the coupe at \$2,850. This coupe is indicative of the streamline ideas of the National body-maker and not only has the sloping hood but also is curved with sweeping lines at the rear and top.

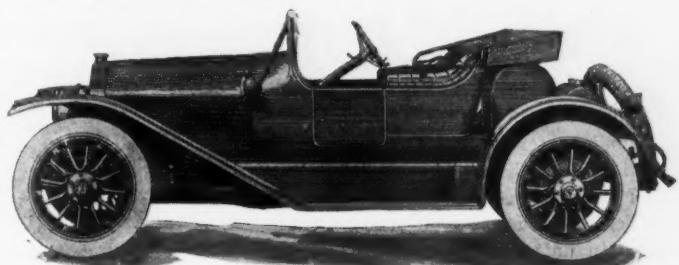
In the matter of equipment there is included Warner speedometer, driven from a gear on the universal at the forward end of the propeller shaft and the pinion bracket is bolted to a cross member of the frame; electric horn, 12-inch black and nickel electric headlights with double bulbs, the smaller ones displacing the sidelights, Firestone demountable rims with one extra, also are supplied as stock equipment.

KOKOMO CELEBRATES

Kokomo, Ind., Dec. 12—Byrne, Kingston & Co. and allied concerns, the Kokomo Electric Co. and the Kokomo Brass Works, gave a reception and banquet in their

newly completed administration building, Wednesday night, at which the leading manufacturers of Kokomo were present, and participated in the speech-making. Charles T. Byrne made a speech of welcome, briefly reviewing the growth of the three allied companies their inception, a dozen years ago, to the present time, when they are among the largest in the industry. J. W. Johnson was toastmaster. In all some 300 were seated at the banquet tables. The officers of Byrne, Kingston & Co. are:

George Kingston, president and manager; C. T. Byrne, vice-president; J. W. Johnson, secretary and treasurer. Kokomo Electric Co.: C. T. Byrne, president; J. P. Grace, secretary; J. W. Johnson, treasurer; George Kingston, general manager. Kokomo Brass Works: C. T. Byrne, president and secretary; J. W. Johnson, treasurer and manager. The new administration building represents an investment of somewhat over \$30,000 and is two stories in height, with a very ample basement. The building is 80 feet front and 40 feet in depth.



ROADSTER BODY IN NEW NATIONAL SIX CHASSIS HAS SMOOTH LINES

Paterson Has One Four-Cylinder Chassis Instead of Two

Company at Flint, Mich., Invades Low-Priced Field

A ROADSTER and a touring car, each built around the same four-cylinder chassis, will represent the W. A. Paterson Co., Flint, Mich., in the motor world for 1914. This chassis is an entirely new creation for the Paterson concern and superseded models 43 and 47 of last season both of which were fours also.

Hand in hand with this policy of concentration on the production of one chassis model, the Paterson concern shifts its allegiance from the medium-price class to the low-price market and accordingly will have a larger output than heretofore. To make this plain, the 1913 model 43 Paterson sold for \$1,685, while model 47 was priced at \$1,985. The new model sells for \$1,197 with touring car body and \$1,147 as a roadster.

The New Paterson

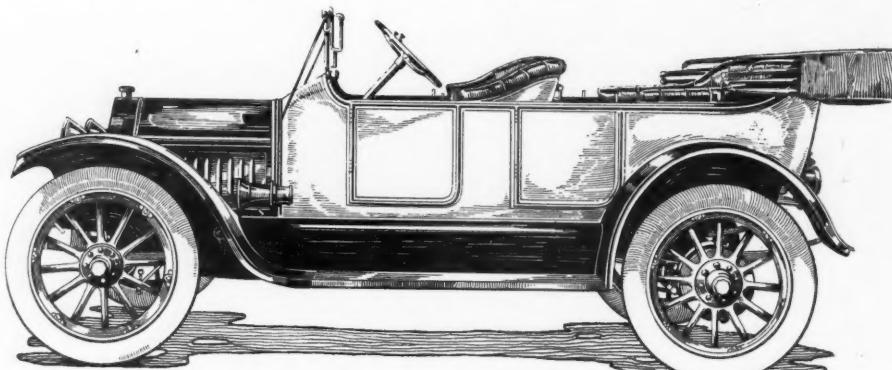
This new Paterson, which is called model 32 as a roadster and model 33 as a touring car, is composed of a number of units of well known make. It has, for instance, a Northway motor to which is fitted the combination electric cranking, lighting and ignition unit of the Delco make, Weston-Mott axles, Jacox steering gear and other parts which are by-words to the trade.

The wheelbase of the car is 112 inches and the length has been so distributed and the body so designed that plenty of room is given for each of the car's occupants. Doors have been made wide enough for easy entrance and exit under all conditions. These are points which must not be overlooked in the well designed car of today. Prospective buyers know that the mechanism of the modern motor car is apt to be all that could be desired, hence they are turning more and more to the consideration of the details which make for comfort and convenience.

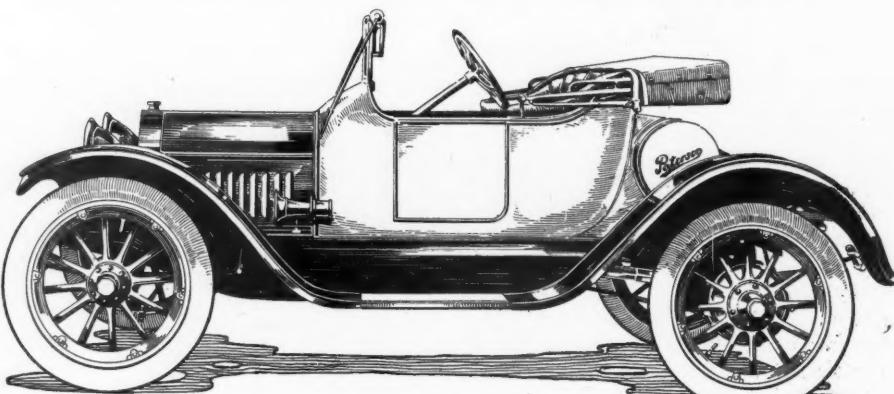
The principle of the Paterson chassis design is the two-unit construction whereby the motor, clutch and gearset comprise the forward unit and the rear is made up of the rear axle assembly consisting of the final drive and the differential gears. This construction is very prevalent in motor car design, making quick assembly possible and at the same time lending greatly to simplicity and efficiency.

The motor is the standard Northway type of 3½ inches bore and 5 inches stroke. Its piston displacement is 192.4 cubic inches and its stroke bore ratio 1.43. This long-stroke feature gives the motor a horsepower of 28 on the block although the standard formula of the S. A. E. accords it only 20 horsepower.

The cylinders have L-heads and are cast in block. The upper half of the crankcase is in unit with the cylinder casting and carries the three crankshaft mountings. A distinctive feature is the removable plate at the top which really is the



NEW PATERSON FOUR-CYLINDER TOURING CAR LISTING AT \$1197



PATERSON'S 1914 FOUR-CYLINDER ROADSTER LISTING AT \$1147

FEATURES OF PATERSON FOUR

One new chassis replaces two 1913 models

Company invades low-priced field, listing touring car at \$1197 and roadster at \$1147

Four-cylinder 3½ by 5 Northway motor

Wheelbase, 112 inches

Two-unit chassis construction

Flush-sided bodies and clean running boards

head for each of the cylinders. This plate is held securely to the main casting by substantial bolts, and after they have been taken out, the head is removed readily, giving free access to the top of the pistons and to the valves. This head carries the spark plugs, the priming cups and the water outlet connection.

Three-Point Suspension

The three-point suspension of the power plant is taken care of in the usual way. The front center rests on a frame cross member, while integral arms extend to the side rails from that portion of the extension of the crankcase which houses the flywheel and clutch.

Valves and intake and exhaust manifolds are on the left side, there being an

individual opening into each cylinder from the exhaust header while one connection for each two cylinders suffices for the intake. Two plates inclose the valve mechanisms completely. These covers incorporate the latest in crankcase breathers. There is an opening through each cover which allows the air within to communicate with that outside. The breathing takes place through the valve tappets and thence out through these cover passages into the open.

Aids in Lubrication

This has the double advantage of doing away with special breather pipes and drawing a small amount of oil upward around the tappet parts to effectively lubricate them. The valves themselves are all interchangeable and have a clear opening of 1 9/16 inch.

The pistons are constructed of special cast iron and are each fitted with three eccentric piston rings which are pinned to keep them from turning. These pistons are 4 1/2 inches long and the rings 1/4 inch wide. They have 7/8-inch special steel piston pins which are hardened and ground to size. The crankshaft and connecting rods are forgings, as is also the camshaft with its integral cams.

The lubrication of the Paterson motor is by the constant-level splash arrangement. The lower half of the crankcase is divided into pits by low walls and the oil is at constant level under all road condi-

tions, it is said. This gives each connecting rod scoop an equal dip. Specially-designed dippers with which the connecting rods are provided carry the oil up to the connecting rod bearings, while a system of grooves cast in the side of the crankcase conveys the oil in turn to each compartment or trough as it is splashed against these crankcase walls. Oil is pumped from the reservoir at the bottom to the crankcase by a positively-driven plunger pump. This pump is adjustable and the lubricant is passed through a sight-feed so that the supply may be regulated to suit conditions.

The cooling of the engine is made very efficient by the use of large waterjacket spaces, a centrifugal pump mounted on the right side of the motor and a cellular radiator of the Long make. The water connections are of large size so as not to impede the circulation in any way.

Delco System Used

The combination Delco unit which takes care of all electric requirements is mounted on the right side of the engine and back of the water pump, to the extension of the shaft of which it is connected when being driven as a generator. In the Delco design used, the ignition distributor is integral with the motor-generator at the

front end. When operating to crank the engine, the unit receives its current in the usual way from the storage battery, the electric switch and the reduction gearing mechanism being so interconnected that when the current goes to the motor, the gears shift into mesh with the flywheel and thereby turn the crankshaft.

Housing Reduction Gearing

The reduction gearing between motor and engine is housed integral with the flywheel housing and consists of two sets of gears which are shifted when connection is required. The shifting gears are on a countershaft and mesh with both the flywheel gear and the motor pinion at the same time. Thus, except when in cranking position there are no gears in mesh to be noisy. A clutch mechanism disconnects the generator drive at the other end when the electric unit is operating as a cranking motor.

With this electrical apparatus, a 6-volt, 100-ampere-hour Exide storage battery is supplied. This is carried on the right side of the gearbox and inside of the frame. It is reached through the front floor board.

The clutch is of the cone type and leather-faced with spring inserts to assist in easy engagement. It acts within the

flywheel which has a diameter of 14 inches and a face width of $4\frac{1}{4}$ inches. As with all conventional unit power plants, the gearbox containing gears for three-speed combinations bolts to the rear of the flywheel housing through a flange. This gear-set is of the selective type and is mounted on ball bearings throughout. The gears and shafts are constructed of chrome-nickel steel.

The new Paterson has a very efficient drive to the rear axle. Fitted with a Spicer universal joint at the front end, it enters the torsion tube just back of this part. The torsion tube, instead of having a yoked front end, each arm of which yoke construction bolts to a cross member as in the ordinary practice with this type of drive, does away with this yoke and makes use of a thrust bearing on the propeller shaft at its front end. This is lubricated through a grease cup. Part of the drive is taken through the rear springs, as well. There are no radius rods. The drive shaft has a diameter of $1\frac{1}{8}$ inch and is made of high carbon steel.

The rear axle is floating and has nickel steel shafts $1\frac{1}{4}$ inch in diameter. Its differential gears are made of carbon steel and the drive pinion from nickel steel. The bearings are Hyatts throughout. Internal and external brakes are fitted acting on the wheel drums. They are 12 inches in diameter and $2\frac{1}{4}$ inches wide.

The frame has a single drop and is made of high carbon steel. It is well reinforced with gusset plates and cross members. The side rails have depth of 4 inches and at the widest part measure 3 inches across.

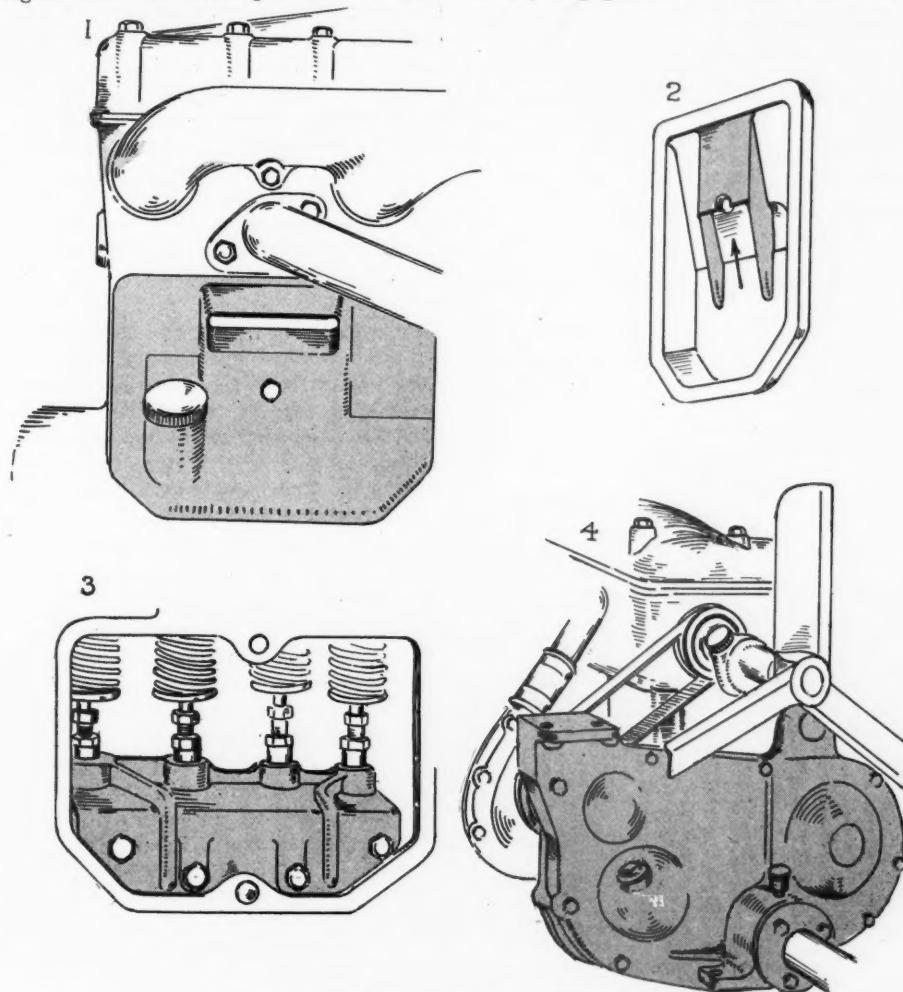
Left Drive and Center Control

Left drive and center control are fitted. The Jacox steering gear used is of the irreversible type, operating through the use of a worm and double nut. The wheels are of the artillery type and fitted with 32 by $3\frac{1}{2}$ -inch tires, front and rear, which are of the artillery type and fitted with touring car carries a 14-gallon gasoline tank under the front seat, while the roadster fuel reservoir is placed back of the seat. It has a capacity of 27 gallons.

Paterson bodies are of the flush sides design with no door handles or exposed hinges. The running boards are clear of everything. An idea of the roominess may be gained from the fact that the roadster seat is 40 inches long. There is a distance of 29 inches between its front edge and the sloping front floor board, giving plenty of leg room. Doors are 19 inches wide.

The equipment includes everything required by the motorist. A feature of the motor design is the provision made on the front of the timing gear housing for the mounting of a tire pump should the car owner at any time feel that he wants one. This pump, however, is not furnished as standard equipment.

With tanks filled and complete equipment, the Paterson touring car weighs 2,680 pounds, while the roadster in similar condition tips the scales at 2,410 pounds.

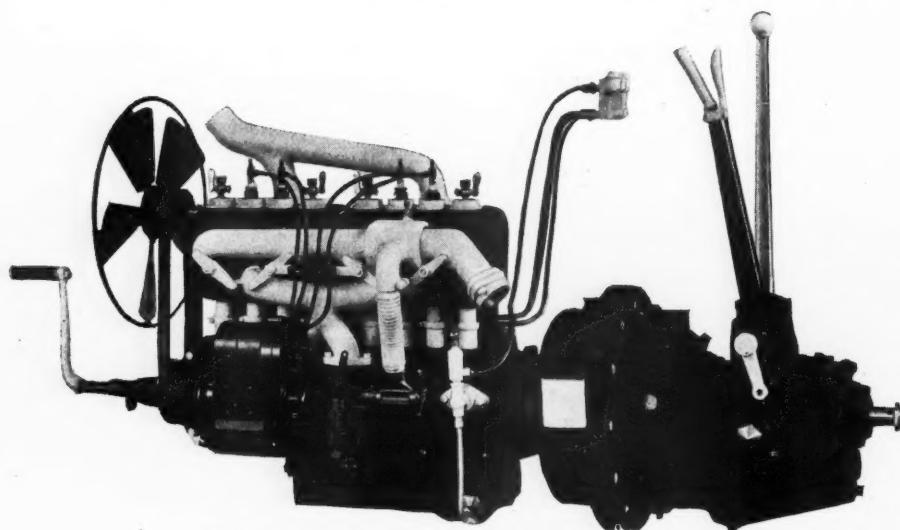


MECHANICAL FEATURES OF THE PATERSON

1—Breather in valve cover of Paterson motor. The oil breathes up through the valve tappet holes, lubricating them. The rectangular slots in the covers are open to the outside air. 2—Looking within a valve compartment, showing tappet bearing assembly for each two sets of valves; also adjustment. 3—Inside view of valve cover, showing how it gives a breather effect. 4—Timing-gear housing, showing bracket supplied for mounting of a tire pump

New Motor from Detroit Maker

Golden, Belknap & Swartz Launch a Four



NEW GOLDEN BELKNAP & SWARTZ POWER PLANT
Features of the four-cylinder motor are the design of the thermo-syphon system, and the silent chain drive of the shafts

THE latest to come from the shops of the Golden, Belknap & Swartz Co., Detroit, is a four-cylinder motor of the unit-power-plant type which has a bore of 3.75 inches and a stroke of 4.25 inches. These dimensions give a stroke-bore ratio of 1.13, and according to the S. A. E. formula, the horsepower is 22.5. But since the stroke is considerably greater than the bore, the motor is capable of delivering 25 per cent in excess of this rating. The piston displacement is 187.9 cubic inches.

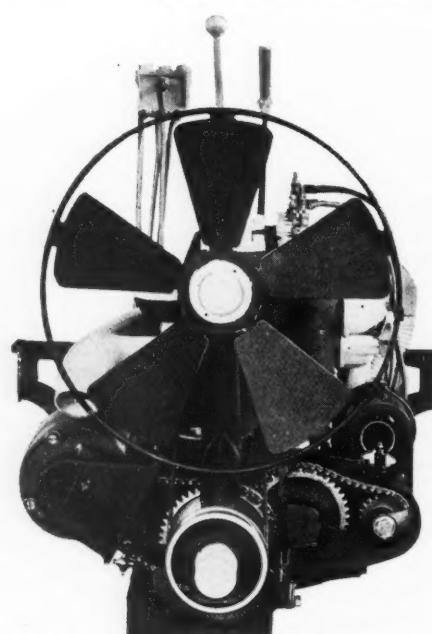
The Golden, Belknap & Swartz concern long has been known as a builder of motor car motors, and in the new design, we find even greater refinement. Simplicity, flexibility and silence have been especially striven for and the complete inclosure of all moving parts is in line with this aim. **Cylinders in Pairs**

The cylinders are in pairs and of the L-head type with waterjackets of large size integral. Valves and gas manifolds, and magneto and carburetor are on the left side, leaving the right entirely clear except for the inlet water connections and the electric motor-generator. The crankcase is of the barrel type and gives support to the three crankshaft bearings as well as those of the camshaft. The oil reservoir bolts to the bottom of the crankcase, while on its left side there is a large plate which may be removed to get at the bearings. The left side has two such plates, each inclosing practically half of the length with a breather pipe between.

Crankshaft and connecting rods are made from high carbon steel of rigid analysis and tensile strength according to the maker. Crankshaft and flywheel are given very careful balance on special balancing machines. Such accuracy is an enemy to vibration, racking of the parts and consequent wear and noise.

Timing gears are eliminated in this motor. Silent chains well inclosed at the front end take their place for operating the camshaft, magneto and generator. These can be readily seen in the front view of the motor. One distinctive feature of this chain drive is the provision made for the taking up of the slack which gradually wears in the chains. Those parts of the sprocket and chain housings which carry the magneto sprocket and the electric motor-generator sprocket are separate from the main portions, being held in place by holding bolts.

When wear occurs, these bolts may be removed and special gaskets inserted between the two parts to take up the desired



FRONT VIEW OF GOLDEN MOTOR
Showing silent chain drive of the camshaft, magneto and generator

chain slack. These gaskets are kept in stock in thicknesses varying from .003 to .02 inch so that all conditions can be met. The motor-generator chain and sprockets are in front of the camshaft and magneto drive. The chain for this passes from the crankshaft sprocket over the camshaft sprocket and on to the magneto shaft sprocket. Thus only two chains are used. These are inclosed so as to run in oil.

Each valve stem and spring is individually inclosed in such a way as to be free from foreign oils and grit, but at the same time they are readily accessible. The tubular housings are telescopic, and when the clamping screw is loosened, the lower part slides upward over the top portion so that the tappet adjustment is completely exposed. Of course after the valve spring has been removed, the cylindrical affair is easily slipped off.

The oiling system is of the combination force-feed and splash type, the plunger oil pump operating from No. 4 exhaust cam. This forces the oil first to the dash sight feed and thence to the three main crankshaft bearings. The connecting rod bearings and pistons are oiled by the splash in the crankcase. The oil also is led to the chain-driving mechanism. The motor utilizes thermo-syphon cooling very successfully. The designers realize that thermo-syphon, to be at its best must have large water connections of exactly correct proportions as borne out by experiment, and have provided such. This cooling is well backed up by an efficient shape of fan, belt-driven from an extension of the crankshaft. The bracket carrying this fan is easily adjustable at its lower end to give the desired tension to the belt.

The electric motor-generator is placed on the right front side and is of standard make. It performs the functions of first operating through its chain connection the crankshaft, and after the engine has taken up its own running is in turn driven by the former. This electric unit has no connection with the magneto ignition circuit, which insures against ignition failure due to an open or short circuit in the cranking system.

Has Dry Plate Clutch

The clutch used with this power plant is a dry-plate type having two raybestos friction disks, between which is a steel disk. The clutch is designed for extreme simplicity and ease of operation together with simple adjustment. It is the maker's claim that there are no expensive parts requiring frequent replacement, the only wearing parts under ordinary use being the two friction disks which are guaranteed for a minimum of 2 years' service. The clutch is housed partially within the flywheel housing and partially back of it in the forward extension of the gearbox. This latter bolts conventionally to the flywheel case through a substantial flange construction.

The gearset is a compact unit of stand-

ard make, the Detroit Gear and Machine Co. supplying the motor builder with this part. It is a three-speed forward type having ball bearings throughout. The gears have a face of $\frac{5}{8}$ -inch and are of special steel. This gearset is provided with center control and besides a lever for this purpose, an emergency brake lever is also furnished.

Conventional method of suspension of this unit power plant is provided for. The three-point design is used, whereby the single support is at the front, while arms extend out for attachment to side frame rails from the flywheel housing. This rear support is not integral with the crankcase, but is attached between the gearcase and the crankcase flywheel housing flange. Thus the gearset may be disconnected entirely without disturbing the engine.

Some dimensions follow:

Crankshaft front bearing— $1\frac{1}{2}$ inches diameter by $3\frac{1}{2}$ inches length.

Crankshaft center bearing— $1\frac{1}{2}$ inches diameter by $2\frac{3}{4}$ inches length.

Crankshaft rear bearing— $1\frac{1}{2}$ inches diameter by 4 inches length.

Connecting rod lower bearing— $1\frac{1}{2}$ inches diameter by 2 inches length.

Flywheel diameter— $11\frac{1}{2}$ inches.

Flywheel width— $3\frac{3}{4}$ inches.

Overall length power plant from front support to rear of gear assembly—48 inches.

Overall width— $26\frac{1}{4}$ inches.

From crankshaft center line to top of water connection— $19\frac{1}{2}$ inches.

From crankshaft center line to top of fan— $20\frac{1}{4}$ inches.

Below crankshaft center line— $7\frac{1}{4}$ inches.

DOES AWAY WITH CARBURETER

Providence, R. I., Dec. 15—John B. Desroches, of this city, claims that by mixing three liquids at a total retail cost of 80 cents he can run his car 800 miles. He has devised an appliance that does away entirely with the carbureter. That he can run a motor with his device he has demonstrated to a number of his friends in Providence and hereabout.

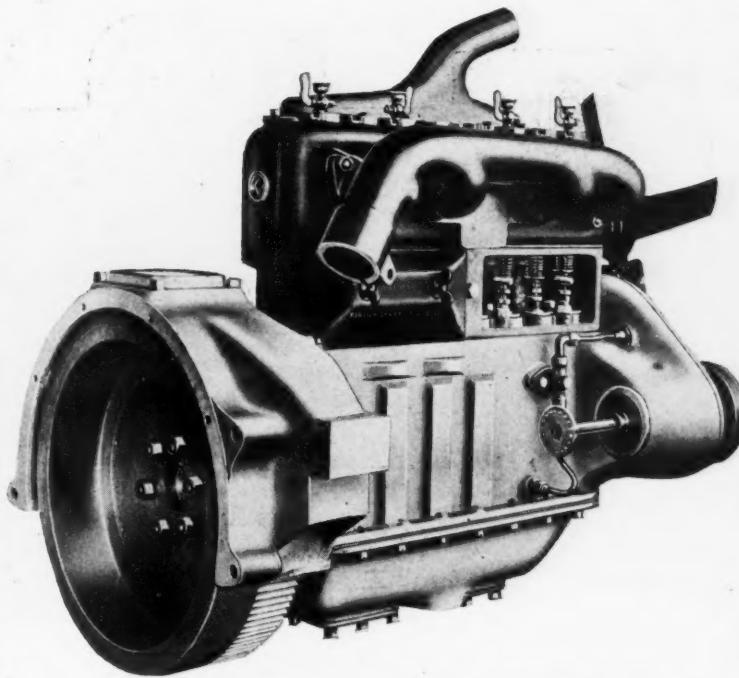
The device is a simple one, the mysterious part of the whole thing being the mixture. He removes the carbureter and the feed pipe from the ordinary motor and in their places attaches to the manifold a box, made of brass, about 12 inches long, 6 inches wide, and 4 inches deep. The interior of this box, Desroches says, is made of two compartments. On the top are two cylindrical-shaped brass cups which look like oil cups. A pipe from one of these feeds into one compartment and a pipe from the other feeds into the second compartment.

Into each of these cups Desroches pours portions of three liquids. When these are filled there is enough of the liquid to operate a motor car, he says, for 100 miles. To one end of the brass box is attached a pulley and a belt runs from the pulley to the fan on the engine. The mixture, he claims, forms a powerful gas which does not create any carbon in the cylinders and is odorless. He has yet to find a satisfactory device to regulate the mixture of the liquid and the air, although at present he does it by regulators. He claims that he used 9 per cent of the air and 1 per cent of the liquid to get his gas.

Continental Announces New Motor Called the Model N Small-Car Type

THE model N Continental Baby is the name of latest product of the Continental Motor Mfg. Co., Detroit, the newcomer being designed to supply the demand for a small four-cylinder motor. The Baby is the smallest motor the Continental factory ever has turned out, the bore being $3\frac{1}{2}$ inches and the stroke 5 inches, and despite the S. A. E. rating of 20.2, the brake test shows a little in excess of 32 horsepower at 2,000 r. p. m.

Shows a little in excess of 32 horsepower at 2,000 r. p. m. and has a number of features which makes it in demand for small-vehicle use



NEW CONTINENTAL MODEL N MOTOR

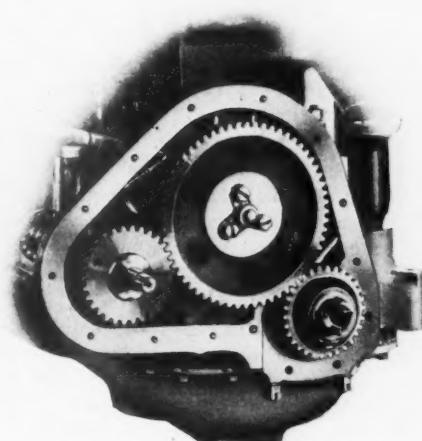
oil directly to the timing gears and the rods dipping into the basin reservoir.

In two other Continental motors, the models C and E, many changes have taken place. The pistons have been re-designed, making them lighter; the piston rings now are $\frac{3}{16}$ instead of $\frac{1}{4}$ inch and the wrist-pin bearing changed from cast iron in the piston to a bronze bushing in the head of the connecting rod. The other reciprocating parts have been reduced in weight, the bearings of the crankshaft and rods now are bronze-backed and the crankcases have been redesigned to accommodate several more cranking systems.

TO MAKE PNEUMATIC DOOR OPENER

St. Louis, Mo., Dec. 15—Local men, mostly connected with the Cole Motor Co. of Missouri, have organized the Pneumatic Devices Co. with a capital of \$50,000. The company will market an electro-pneumatic door opening and closing device especially adapted to use on theaters and garages. The device is the invention of Frank Knight of New Haven, Conn. By means of the device the pressing of an electric button opens and closes the door at any distance from the operator, pneumatic pressure being the power. The device, it is claimed, enables garage owners to swing open their doors at the sound of the motor horn, without leaving their tasks.

It also enables theater officials to open the doors of their houses from the office when fire or panic makes such a move necessary.

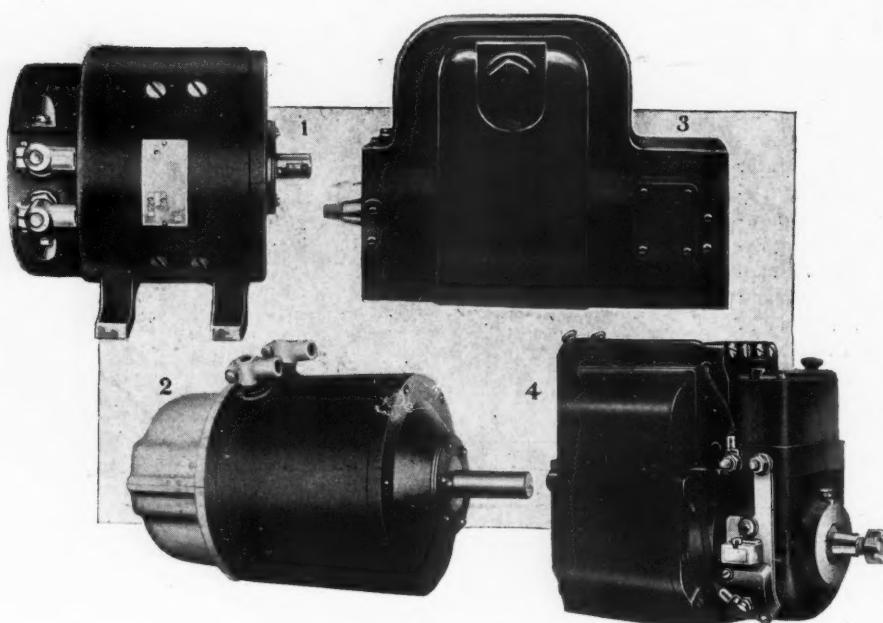


CONTINENTAL BABY FRONT END

The L-head construction requires the use of but a single camshaft. The timing gears shown are of the helical type

New Remy Cranking and Lighting Apparatus Announced

Four Types of Motors—Details of Construction



NEW REMY ELECTRICAL APPARATUS

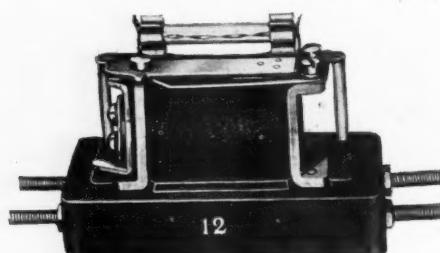
1—Model 6, one of the cranking motors; 2—Another simple type of motor known as the model 5; 3—One of the latest Remy generators called model 10 and which is said to carry a load of 12 amperes at 10 miles per hour; 4—Model O generator which is capable of carrying a 7-ampere load at 8½ to 10 miles per hour

LECTRICAL apparatus for cranking, lighting and ignition for every type of vehicle is announced by the Remy Electric Co., Anderson, Ind., the line consisting of separate motors, generators, motor-generators and machines for lighting and ignition and ignition alone.

Four cranking motors are offered, known as the models 4, 5, 6 and 9, all 6-volt, series-wound, ball-bearing machines, the variety being necessary to supply the demand of the numerous motor types. The core disks, commutator segments and most of the detailed parts are of standard construction. Inspection plates are provided for the examination of the brushes and commutator and the machines made as simple as possible and yet productive of enough energy to do the work of the more cumbersome apparatus.

Two Types of Switches

Push and pull type switches are offered, both being built on the same general lines



ONE TYPE OF RELAY

This is used in connection with the model O generator

as regards material and size. The push type is mounted either on the motor side of the dash or under the floor boards, the pedal only protruding, while the pull type is fitted with a base so that it may be placed conveniently in connection with the gear linkage.

Low-Speed Type Generators

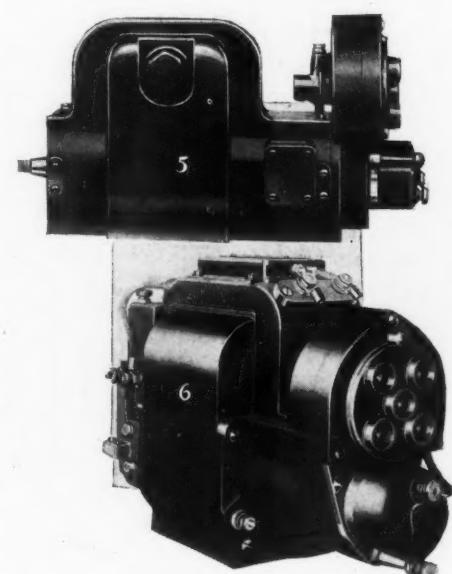
The Remy generators are of the low-speed type, the model O being capable of carrying a load of 7 amperes at 8½ to 10 miles per hour and the model 10 a load of 12 amperes at 10 miles per hour. The regulation is inherent, being accomplished by the use of a third brush, which eliminates the necessity of electro-mechanical or mechanical complications. These generators are of the bi-polar type, shunt wound, the fields being impregnated with a compound said to have high-insulating and heat-resisting qualities. Ball bearings are used on the armature. The feature of the generators, as with the motors, is accessibility of the parts requiring periodic inspection. By loosening one screw a unit is removed which contains the brush, brush spring, brush holder and connecting wire. It is claimed that arcing at the brush is eliminated, the brush being made of a carbon-copper composition which not only increases brush life but lessens the inspection tours and the chances of the usual troubles occurring.

To prevent the battery from discharging through the generator a non-adjustable reverse-current relay is provided. When the battery voltage is slightly less than the

generator voltage, the magnet of the relay is energized, thus attracting a blade which completes a circuit between the generator and battery and when the reverse takes place, that is, when the generator voltage is less than the battery voltage, the magnet is de-energized and the generator and battery are not connected, thus preventing any discharge into the generator. On the model 10 the relay is a separate unit while on the model O it is mounted on the generator. Suitable junction blocks are used to eliminate any complications of wiring.

Novel Motor Generator

The Remy motor-generator takes the name of SL, and is built in two sizes with a number of different windings depending upon the type of motor in which the system is installed. Two separate armatures are used, the one for the motor being above that of the generator. The features of the double-armature instrument, it is claimed, are absence of intricate mechanism, only one clutch is necessary, and one point of attachment to the engine required. When the engine is cranked by the motor and takes up its own cycle, the motor automatically is disconnected through the agency of an over-running clutch and the generator thrown into operation, so that while the engine is in operation the only moving part of the apparatus is the generator armature. The reduction gears are of the helical type and are fitted to the motor armature and counter shaft. The other gears are spurs. All gears are enclosed in an oil-tight compartment and precautions have been taken to prevent any



REMY MAGNETO TYPE BATTERY IGNITION

Consist of a generator, magneto distributor and circuit breaker, the ignition parts being incorporated with the separate generators

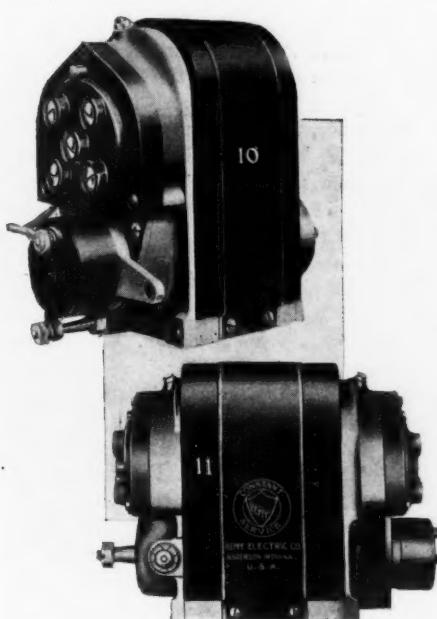
lubricant making its way to the fields or armatures.

This system is fitted also with a reverse current relay, designed to be fitted to the dash. Provision is made on the relay for two additional circuits. The starting switch for the SL motor-generator model is known as the 25.

New Ignition Featured

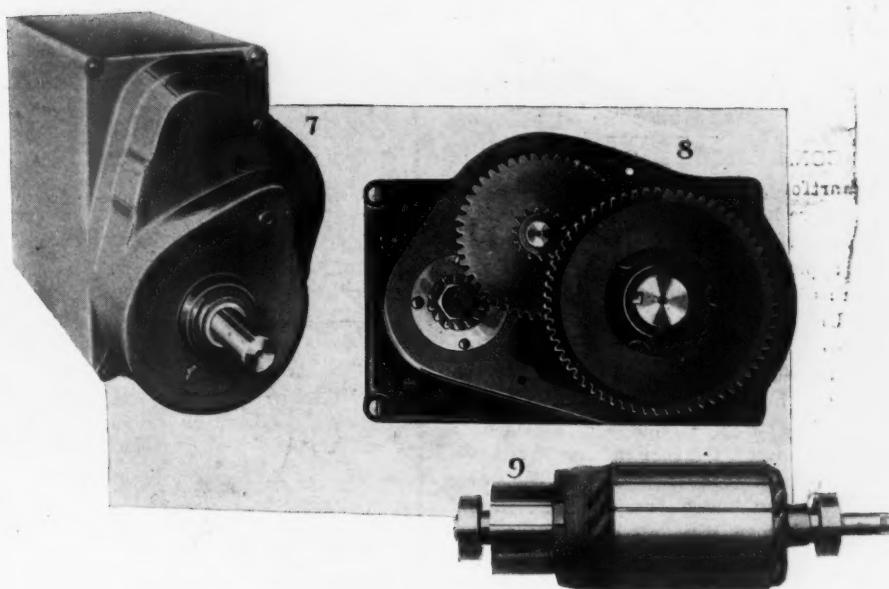
Magneto type battery ignition is the name given a Remy product which consists of a generator, magneto distributor and circuit breaker, the ignition parts being incorporated with the separate generators, models O and 10. This type of machine supplies sufficient current to charge the battery the current from which is taken for ignition purposes. The generator-ignition systems, as they may be called, are known as the OB and 11, the generator part of the former being identical with the O generator and the model 11 generator being the same as that of the model 10. The OB and 11, the former being designed for large engines and the 11 for small types. The distributor, gears, etc., for ignition are the same as those used on the Remy magneto, while the coil is a specially designed one with both ends of the primary winding insulated, so that the ignition will be unaffected in the event of a ground in the lighting or cranking circuit. The coil is said to have a minimum of lag and gives an efficient spark at the plugs at as low as 2 volts.

As announced previously in Motor Age, the Remy Electric Co. has brought out a number of new magnetos for 1914, all of which are of the shuttle armature type. The model P, one of the new ones is designed for single ignition, the model 31 for two-point, while the remainder of the line is confined to magnetos for tractors and trucks.



TWO NEW REMY MAGNETOS

Above is shown the new model P and below the double distributor type, for two-point ignition, known as the model 30



REMY MODEL SL MOTOR-GENERATOR

7—This instrument employs two separate armatures, the one for the motor being above that of the generator. Only one clutch is necessary with this type and but one point of attachment to the motor. An over-running clutch automatically disconnects the cranking motor when the engine begins to fire; 8—Gearing of the SL; 9—SL armature

Gerber Not to Move Plant to Pittsburgh

New Plans Made for the Abbott

DETROIT, Mich., Dec. 15—Several reports that E. F. Gerber, who recently purchased the entire assets of the Abbott Motor Co., this city, had decided to move the plant to the vicinity of Pittsburgh were stamped as groundless in a statement issued to Motor Age on December 12:

"The Abbott factory is not going to move from Detroit," says Mr. Gerber. "We are now making extensive alterations and changes in the plant, which will materially increase its capacity and minimize the operating expense."

There is, however, a minor change in that the name Abbott Motor Co. has been lengthened into Abbott Motor Car Co., while Gerber himself has assumed direct supervision over and management of the concern. A. E. Schafer, who became president and general manager when the creditors' committee took a hand under the old order of things, has retired from the concern, as has also L. B. Sanders, who was sales manager. M. J. Hammers, chief engineer, is retained in that capacity by the new owner, as is the present manufacturing force.

Inasmuch as the purchase of the Abbott Motor Co. was a cash one, the new Abbott Motor Car Co. enters upon its career with a clean slate and free from liabilities. Mr. Gerber states that in addition to the original purchase price, such further investments as the business needs will be added from time to time, with the idea of discharging all bills.

Mr. Gerber states further that he has been in actual possession and control of the Abbott plant since November 25, and has furnished the money on which it has

been operated for 30 days prior to that time. In the month of November, he says, the output of previous months was more than doubled, while he predicts a gain of another 100 per cent for December.

The Abbott factory is operating with a force of 140 men at present, but it is expected that this number will be brought up to 200 within a very short time. The Abbott models will be continued with only slight changes.

REPORTS ON C. B. CO. OUTLOOK

COLUMBUS, O., Dec. 15—A committee consisting of six business and professional men of Columbus has made a complete investigation of the financial conditions of the Columbus Buggy Co., which has been operated by a committee of creditors for the past 5 or 6 months. The committee made the investigation with a view of reorganizing the company or incorporation of a new concern to take over the property.

The committee found that the plant has been operated at a loss by the committee of creditors and that there is no future in the concern unless reorganized. Several plans for reorganization are proposed and several capitalists of the Buckeye capital



ARMATURE OF REMY MAGNETO

The one shown is used in the model P magneto. All Remy magnetos have shuttle-type armatures

have interested themselves in the reorganization. The report showed the net earnings for the 6 years ending December 31, 1912, to be \$555,123. For the year 1912 the net earnings were but \$3,123.

CONNECTICUT BACKS UP POPE

Hartford, Conn., Dec. 13—Boston interests have been unsuccessful in their efforts to have three receivers for the Pope Mfg. Co. appointed in the Connecticut jurisdiction as has been done in Massachusetts by the United States court. Judge William S. Case of the superior court has appointed Colonel George Pope sole receiver of the company in this jurisdiction, much to the satisfaction of the friends of the colonel in this vicinity. Connecticut interests have been opposed to three receivers. The faith expressed by Judge Joseph P. Tuttle in Colonel George Pope on his appointment as temporary receiver is reiterated by Judge Case.

HEINZE TALKS MOTOR DESIGN

Indianapolis, Ind., Dec. 15—A new attendance record was established by the Indiana section of the Society of Automobile Engineers on the evening of December 9, when 125 men identified with the motor industry attended the monthly meeting here. It was an open session and motor car men from all parts of the state attended.

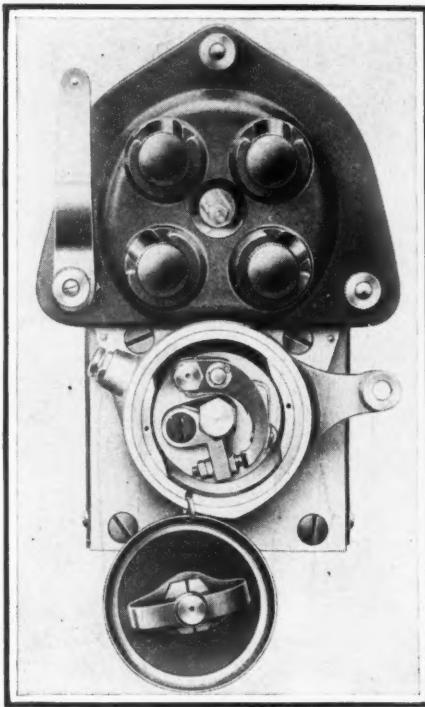
The speaker of the evening was J. O. Heinze whose subject was "the Trend of Motor Designs." Mr. Heinze is chief engineer of the Northway Motors Co. and consulting engineer of the Heinze Electric Co. He handled his subject most acceptably, dealing with the basic principles of successful four and six-cylinder motors.

C. P. HENDERSON WITH REGAL

Detroit, Mich., Dec. 11—The Regal Motor Car Co. announces the election of Charles P. Henderson to the vice-presidency of the company. Mr. Henderson formerly was a director of the Cole Motor Car Co., Indianapolis, and manager of its sales and advertising departments. He left the Cole company to take the presidency of the Henderson Motor Car Co. at the time of its formation in Indianapolis. The Regal announcement states that the Henderson car still will be made on a conservative basis and that Mr. Henderson will continue as its head in an advisory capacity.

STEGEMAN QUOTES PRICES

Milwaukee, Wis., Dec. 15—The Stegemann Motor Car Co., Milwaukee, Wis., announces that in order to give the choice of either the open or inclosed chain type of drive it will in the future build its trucks with the chain cases or without. The prices for open-chain cars will be as follows: 1-ton, \$2,100; 2-ton, \$2,800; 3-ton, \$3,350; 4-ton, \$3,800; 5-ton, \$4,200. If inclosed chain drive is wanted, an additional charge of \$150 will be made to the above.



NEW SPLITDORF MAGNETO

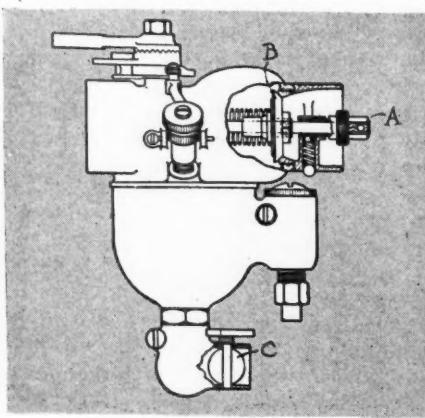
Of the high-tension type and embodying a number of special Splitdorf features which make it an efficient sparking device

New Splitdorf Magneto

A NEW high-tension magneto, known as the model EU-4, is announced by the Splitdorf Electric Co., Newark, N. J., the new instrument being said to be dust and waterproof and most efficient for low-powered, high-speed motors.

In construction the new Splitdorf embodies an aluminum base to which the pole pieces are secured and between which the armature revolves. The armature is mounted upon ball bearings and before being installed is impregnated with a heat-proof compound which also acts as a protection to the winding. Over the armature is a condenser which is clamped between two metal plates, the latter being fastened to the pole pieces.

The circuit-breaker is attached to one end of the armature shaft and revolves



SCHEBLER CYCLECAR CARBURETER

First instrument built especially for the new small vehicle and in general is somewhat like the regular model H

with it. It is claimed that owing to centrifugal force the platinum points come in contact in a positive manner at high speed, which permits of the use of a weaker spring than formerly and has the added advantage of reducing wear on the cam.

The EU-4 being of the true high-tension type has both primary and secondary windings on the armature shaft. The high-tension winding is connected with a collector ring imbedded in a spool mounted on the end of the armature shaft. The current is led from the ring by means of a carbon brush and cable.

A number of special Splitdorf features are employed in the new magneto which are claimed to make it an efficient sparking device for high-speed engines and its simplicity, and ability at low engine speeds, are said to appeal to the car owner.

SCHEBLER CYCLECAR CARBURETER

Wheeler & Schebler, Indianapolis, are the first to announce a carbureter for cyclecars, the small car adaptation known as the model H embodying all the features of the regular model H and yet being a special type for cyclecars. The modifications to complete the conversion to cyclecar carbureter were well-planned, according to Schebler engineers and tests both at the factory and on the road have shown its dependability for small car use.

The new Schebler is shown herewith. It is made so that the air passages may be controlled from the seat. The primary air intake C is cable-controlled and at the point A is fastened a cable for varying the opening of the auxiliary air valve B.

TIFFANY'S \$750 ELECTRIC

The new \$750 Tiffany electric, made by the Tiffany Electric Co., Pontiac, Mich., is really a new design. The vehicle illustrated herewith has a most unconventional body design carried on a chassis with 92¹/₂ inch wheelbase and 54-inch tread. The body represents the minimum of cost with a maximum of useful space. The battery, twenty-four cells Willard and weighing 575 pounds, is carried under the rear. It is rated at 102-ampere hours at the 6-hour rate. The motor, a Wagner type, transmits direct to the back axle through a worm deduction of 9.8 to 1. The car is fitted with detachable wire wheels which are interchangeable on all hubs. The front axle is of tubular design and the rear axle of a robust construction. A double cantilever spring suspension system is used with rear springs 38 inches long and fronts 32. The suspension of the body is such that with passengers the distribution of weight between the axles is in the ratio of 3 to 1 on the rear wheels. The vehicle with all equipment weighs 1,430 pounds. The mileage per battery charge is 100 at a rate of 15 miles per hour. All control reposes in the right hand, so that a forward movement gives power and a backward movement applies the brakes. A variation of the pillar steering is employed.

Manufacturers' Communications

INDIANAPOLIS, Ind.—Editor Motor Age—Upon a careful reading of the official report of the Packard electric starter test on the Long Island parkway, I find there are two matters which seem to have escaped attention entirely and which really are important to a correct understanding of the matter under test.

Motor Age will note that the car tested was run with a serious overload of weight in the car, such as spare tires, tools, etc., also with five passengers, and in addition with the top, windshield and all side curtains up. The consensus of opinion among the various writers in describing the Packard test seems to be that these severe conditions of engine load tended toward extreme accuracy in determining the percentage of power consumed by the electric generator. The fact is that the reverse is true.

Since the power consumed by the generator is approximately a fixed load, at normal engine speeds, any condition which compels the engine to consume a larger amount of fuel in propelling the car itself, reduces the percentage of consumption by the generator.

By way of illustration: Let us assume that the car in covering a certain distance under a certain load, consumed 20 gallons of gasoline, of which the generator absorbed 1 gallon, or 5 per cent, which is the approximate showing in the Packard test at 20 miles an hour. Now let us assume that in going over the same distance with only half the load, and under other more favorable conditions, the same car consumed but 10 gallons of gasoline. In this latter case the 1 gallon consumed by the generator would become 10 per cent instead of 5 per cent of the total fuel consumption.

It perhaps is true that this condition in the Packard test which favored the showing of a low percentage as compared with what might be the case under conditions of daily service in fair weather, may have been offset to a degree and perhaps entirely offset, by other conditions with which I am not familiar. But I cite the above illustration in the effort to correct any wrong impression that the unusual load carried in the car and the unusual running conditions, due to wind resistance, tended toward accuracy.

The fact that the Packard in this test ran with its lamps lighted, may mean something in the case of the Packard or it may not, and it may mean something in the case of some other car, or it may not. This all depends on whether the lamp load increases the output of the dynamo, and this depends upon the electric system used. If the coils in the Bijur generator are so wound as to increase the output of the gen-

erator under this condition, then the fact would seem to be significant in the case of the Packard, but please note that this applies to the Packard only.

In any system where such provision was not made, the carrying of the lamp load might depend in its effect entirely upon the condition of the battery, not only with respect to its physical condition, but also with respect to its condition of charge, and this in turn varies in the case of almost every individual car owner, depending as it does, upon whether or not he operates his car sufficiently at generating speed during the daytime to keep the battery approximately fully charged, and also depending upon how much he uses his lights by night.

Those who are more familiar than I am with the minute details of the Bijur system are able to make any necessary inferences in the case of the Packard, but such an inference could not be extended to other cars without knowing, in each instance, the details of the generator construction, and the approximate accuracy of the current regulation.

These comments are not made with any desire to criticise the Packard test, because I realize that this test was probably as accurate as any road test can be, and because its general result confirms the tests made on the Indianapolis Motor Speedway last summer. But in view of the comment which has already been made on the Packard test, by various writers, the foregoing may assist all of us in getting the greatest possible benefit from the test by seeing it from all its angles.—R. H. Combs, Prest-O-Lite Co.

TREGO EXPLAINS STARTER TEST

Detroit, Mich.—Editor Motor Age—There seems to be some misunderstanding about the tests which were made by us on the Long Island motor parkway, as to

the gasoline consumption with and without electrical equipment.

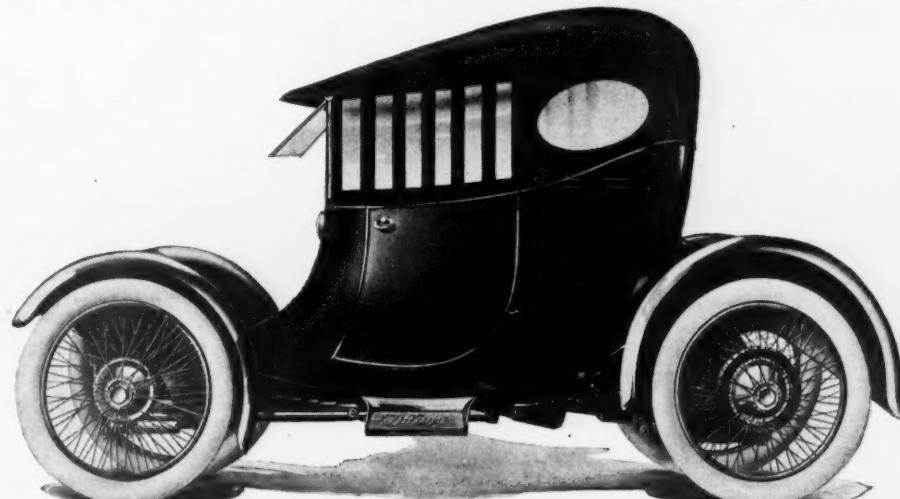
In the letter from R. H. Combs, published in Motor Age December 11, he seems to be misinformed as to the manner in which the car was handled during any given test. Each test was conducted as follows:

The gasoline measuring tank was filled until it contained exactly 1 gallon of gasoline, with the car standing still. Valves were open to connect this tank with the carbureter. It should be remembered that the tank, as well as the pipes leading to the carbureter and the float chamber of the carbureter, were full of gasoline.

The car then was started and accelerated to the required speed and maintained at that until approximately half the gasoline was consumed. The car then was stopped and turned around on the narrow parkway, which required more or less backing and gear work; was again accelerated up to required speed in the opposite direction and the mileage noted when the gasoline flashed past the narrow neck at the bottom of the measuring tank. The car was not allowed to coast during the test.

It is readily seen that the above certainly would consume more gasoline than running around the easy curves of the Indianapolis motor speedway. It also is readily seen that the consumption would be greater than in straightaway test.

It also must be remembered that the motor was cranked for approximately 25 minutes in order to discharge the battery, enough to require 17-18 amperes output from the generator. Under normal conditions, during the day time, the consumption would be very much less than shown by the test, owing to the fact that no lights would be burning and the battery would be fully charged; and, even at night, the normal conditions would be more favorable than the test, owing to the fact that the battery would not be discharged to such an extent as in the test and the lights requiring 10 amperes output would be almost the entire demand on the generator.—Packard Motor Car Co., F. H. Trego, Research Engineer.



NEW TIFFANY \$750 ELECTRIC, DESCRIBED ON PAGE 36



The Readers' Clearing House



TUNING SCHEBLER L CARBURETER

Instructions given for adjusting—Has Two Speed Dials

BLESSING, TEX.—Editor Motor Age—Kindly advise me the proper way to adjust a model L Schebler carbureter.—K. D. Curtis.

The Schebler model L carbureter is illustrated in Fig. 1. Adjust the auxiliary air valve A so that it seats lightly. Then close the needle valve by turning the screw B to the right as far as possible. Turn the screw slowly and as soon as it meets resistance do not attempt to move it farther. When the needle is seated fully turn it back five complete turns. Open the throttle about one-third and start the motor. Slowly close the throttle. If the motor is not running smoothly and slowly adjust the needle valve by means of B and the throttle screw F, until it does. The idle adjustments now are complete. The dials D and E are the intermediate and high-speed adjustments. Adjust the pointer on the dial D about half way between 1 and 3. Advance the spark and open the throttle so that the roller on the track below the dials is in line with the dial D. If the motor backfires turn the indicator toward 3 a little more, or perhaps toward 1. Try both and see which gives the better result. With the throttle open wide or nearly so adjust the high-speed dial E the same way as D was adjusted.

WATER AND SOAP FOR CLEANING
Found Best for Mud—All Nationals Have Left Drive

Los Angeles, Calif.—Editor Motor Age—Is there any better method of cleaning the body of a machine than washing it with water? By this is meant, will water be the least harmful to the paint?

2—What make of starting and lighting system does the 1914 Mercer five-passenger car have? What is the same car geared on high?

3—Are all the 1914 National cars left drive?

4—Is it possible to change two gears at once, for instance; from the low high to the high intermediate, on the 1914 Cadillac?

5—What is the Hudson 6-54 geared on the high and on third speed?—H. C. B.

1—Good soft soap and water is best for washing bodies.

2—The Mercer five-passenger type 35 is equipped with the Rushmore cranking and lighting system. The motor to wheel ratio on high or fourth is 2.82 to 1.

3—The two National chassis for 1914 have left drive.

4—It is not possible to drop into two

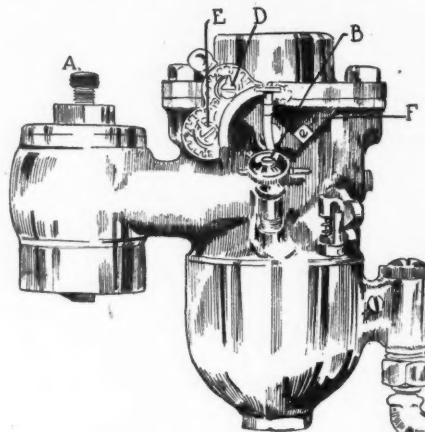


FIG. 1—SCHEBLER MODEL L CARBURETER
Showing the adjusting dials D and E for fuel
and A for air

speeds at once, but it is possible to shift the rear axle gears either to high or low at any speed the car is capable of making.

5—The Hudson 6-54 is geared 3.70 to 1 on third and 2.90 to 1 on fourth.

LARGE TIRES AND MILEAGE FIGURE
Worth While Changing to Oversize Shoes—
Easier Riding Probable

Milwaukee, Wis.—Editor Motor Age—I have a car equipped with 36 by 4½-inch tires. Can more mileage be obtained out of 37 by 5 tires than 36 by 4½ and will I get enough more mileage to pay for the difference?

2—Will a car ride easier with larger tires and will it run more miles on a gallon of gasoline with the larger tires?—William Jones.

1—Under ordinary conditions the larger tires will give more mileage, and this, coupled with the easier riding obtained, should make it pay to make the change.

2—As mentioned above, the car will ride easier with larger tires. Whether the car will give more miles per gallon with the oversize tires is a question, the road conditions being a large factor. Due to increased traction and the ease with which the larger tires take the bumps, they may cause the fuel bill to be reduced.

MOTOR DIMENSIONS OF TWO MAKES
Weights and Mileage Per Gallon of Cars
Also Given

Davenport, Ia.—Editor Motor Age—What is the weight of the 1914 five-passenger Chalmers six, and also about how many miles to the gallon of gasoline does it average?

2—What is the weight of the five-passenger White gasoline car, four cylinder, what is the size of the cylinders, and how many miles to the gallon of gasoline?—A Subscriber.

1—The Chalmers six in five-passenger form weighs 4,136 pounds with water, gasoline and oil tanks filled and with the car equipped fully. The mileage per gallon varies with the gear ratio used. With a 3½ to 1 ratio 7 to 9 miles per gallon will be obtained in traffic, but in ordinary touring 10 to 12 is the usual figure.

2—The White company manufactures two four-cylinder cars known as the GAF

and GEB. The former car weighs about 2,850 pounds in five-passenger form, will travel about 15-20 miles per gallon and has a motor with a bore and stroke of 3½ by 5½ inches. The GEB in five-passenger form weighs about 3,350 pounds, gives about 12 to 18 miles per gallon and has a 4½ by 5¾-inch motor.

OXYGEN METHOD NOT INJURIOUS

Removing Carbon by New Process Found Successful—Car Weights

Glenville, W. Va.—Editor Motor Age—Does the removing of carbon from cylinders by the oxygen method injure the cylinders?

2—What is the S. A. E. horsepower rating for the 1914 Overland? The 1914 Studebaker? The Hupmobile? The Reo?

3—What is the weight, fully equipped, of the 1914 Overland? The 1914 Studebaker six? The Hupmobile?

4—Is the cyclecar practicable in a mountainous state like West Virginia?—Karl Hartmann.

1—It has been found that the oxygen method of removing carbon if properly performed is not injurious to the cylinders.

2—The S. A. E. rating of the Overland 79 is 27.25 the Studebaker four, 19.60 and the six 29.40 horsepower. The Hupmobile and Reo show 16.90 and 25.60 horsepower respectively.

The car names and their weights suffixed follow: Overland, 79, about 2,620 pounds; Studebaker six, about 3,000, and the Hupmobile, about 2,600.

4—No trials have yet been conducted over the country you mention, but tests under severe conditions have shown the cyclecar to be able to perform comparatively well in hilly country.

SPEED OF 1912 KRIT TOURING CAR

Two Gear Ratios Offered—Averaged 40 Miles Per Hour

Paxton, S. D.—Editor Motor Age—What is the original speed of the 1912 Krit touring car?—R. Weis.

The 1912 Krit touring car was marketed with one of two gear ratios, 4 to 1 and 4 4-11 to 1. No definite figures can be given as to the speed of the 1912 Krit, as no observed tests were made. However, it is stated by a number of owners that the touring car with a 4 to 1 ratio turned up about 45 miles per hour. With the 4 4-11 to 1 ratio, the same car would probably have shown about 35 to 40 miles per hour.

DISAGREES ON IGNITION SYSTEM

Reader States A. D. Carpenter Has the Wrong Impression

Chicago—Editor Motor Age—May I be permitted to trespass on valuable space to reply to an article by A. D. Carpenter on make-and-break ignition in the issue of December 4?

Mr. Carpenter states that make-and-break ignition is more satisfactory than

Questions Answered and Communications Received

K. D. Curtis Blessing, Tex.
William Jones Milwaukee, Wis.
H. C. B. Los Angeles, Cal.
R. Weis Paxton, S. D.
A Subscriber Davenport, Ia.
Karl Hartmann Glenville, W. Va.
Donald Herne Chicago
A. Weak Spark Evansville, Ind.
W. R. Kent Clustee, Okla.
Central Iron Works Manitowoc, Wis.

high-tension, and calls upon American engineers to improve cars by fitting this system. How it can be claimed that the low-tension system is superior to high-tension for high-speed engines as used in motor cars I entirely fail to see.

In the first place it is far more complicated, both in operation and adjustment. An extra shaft carrying either eccentrics or cams is required to operate the rods, ground taper joints are required for the rocker arms, and these, unless a perfect fit, are liable to cause loss of compression on one stroke, and an air leak on the suction stroke. Springs on the rocker arms have to be kept at the proper tension, because with a slow break of the points efficiency rapidly falls, and, contrary to Mr. Carpenter's statement, it is most important that the points should be clean. On a six-cylinder car all this extra complication would be a very considerable item and in the hands of a novice would be certain to give trouble.

The statement that missing is bound to occur with a high-tension system when too much oil is used is quite erroneous. If this is so how does Mr. Carpenter account for the fact that no missing is experienced, on racing cars which are belching forth clouds of smoke due to excessive lubrication. With a high-tension system using a spark plug with three points, should a non-conductor such as oil get between one set of points the spark

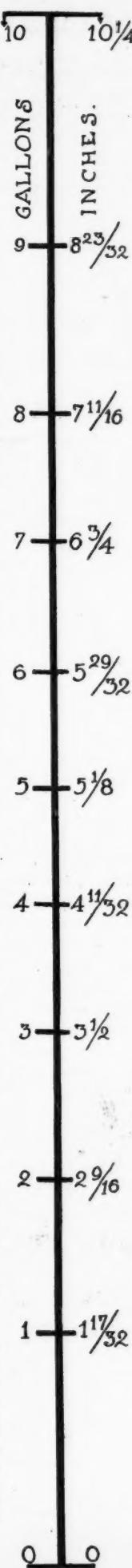


FIG. 2—GAUGE FOR FORD FUEL TANKS
When reproduced on wood the gauge shown herewith will measure both liquid height and quantity. The illustration is the exact diameter of the Ford tank. Ford owners desiring an accurate gauge should cut this out and reproduce it upon some wood rubbed with ordinary graphite

would jump across the others and the ignition of the charge would be unaffected, but in the case of the low-tension this would not be so. I was in a works in England which made 2,000 engines for a firm of motor omnibus makers, these were fitted with a good low-tension system, and inside of a year's running every engine had to be equipped with a high-tension system owing to the difficulty of keeping correct adjustments, and also because of misfiring when an excessive amount of oil was used. After changing to high-tension the engines gave absolute satisfaction.

On low-speed engines the low-tension ignition undoubtedly gives great satisfaction, but on engines running as fast as 2,500 r. p. m. I do not think that it can be claimed for a moment that it is as reliable, or as foolproof as the high-tension system. The extra complication for multi-cylinder engines with the high-tension ignition merely consists of a different spacing and more contact points in the distributor together with more high-tension wires, while with the low-tension it means extra cams or eccentrics, extra rocker arms with ground joints, extra springs, the right tension of which must be maintained to get best results, and last but not least a great deal of extra noise.

With regard to spark plugs being unreliable, I could cite several instances where cars have run more than 3,000 miles without having the plugs even cleaned. Does Mr. Carpenter know of any engine which has run that distance without it having been necessary to remove the plates of a low-tension system? The case mentioned in which the spark plug performed correctly when placed outside the cylinder, but which misfired when working, is not in the least strange, because in the one case the only resistance to the spark was the pressure of the atmosphere, or 14.7 pounds to the inch, while in the other case it might have been anything from 55 to 90 pounds to the square inch, depending upon the design of the combustion chamber. It is absolutely futile to test a plug by laying it on the cylinders. The one and only correct way is to place the plug in a metal tube having a glass window at the opposite end, and having a pressure gauge and tire valve on the sides. Screw the plug in and then pump air in to about 75 pounds pressure, make connections to the plug and tube and watch results. If the pressure is made higher and higher some very interesting observations can be made of the path taken by the spark, and a faulty plug can be discovered immediately.

Simplicity is a thing to be much sought after in automobile construction because cars are handled by persons having no knowledge of machinery, and all manufacturers are doing their utmost in this direction, and as far as ignition is concerned, when simplicity can be combined with obvious superiority, it is hardly likely that makers will fall in with Mr. Carpenter's suggestion and go back to the low-tension

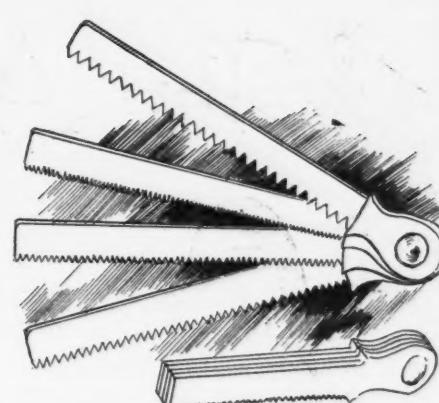


FIG. 3—A SIMPLE THREAD GAUGE
Supply houses offer thread gauges with many blades similar to the above

ignition system. I say go back, because the system was used for a long time on a number of cars and given up.—Donald Herne.

MEANING OF SPARK PLUG TERMS

Centimeter Is Unit for Metric Threads—
Measuring With Gauge

Evansville, Ind.—Editor Motor Age—What is meant by $\frac{1}{8}$ standard and metric when referring to spark plugs and also how one may determine which thread is standard and which metric?—A Weak Spark.

A $\frac{1}{8}$ -inch standard means the standard spark plug as determined by the S. A. E. This plug has a diameter of $\frac{1}{8}$ inch and has a pitch of 18. There are other dimensions which the S. A. E. has set down for the other parts of the plug. The metric plug has a diameter of about $\frac{1}{8}$ and has a pitch of about 17. The pitch means the number of threads to the inch.

Threads are measured with gauges such as shown in Fig. 3, which may be bought of any good supply house. The gauges have many more blades than the illustration shows. Each blade is marked with its pitch number. In measuring each blade is tried and the mark on the one which fits indicates the pitch.

MEASURING FUEL IN FORD TANK

Gauge Given for Determining Depth and Quantity of Gasoline

Clustee, Okla.—Editor Motor Age—The gasoline tank of the Ford car I have is cylindrical and I would like to know how I can determine how much fuel it contains when a foot rule shows the gasoline to be at a depth of 4 inches. What does it hold at 7 inches, etc.—W. R. Kent.

The cylindrical tank of the Ford car you own is $10\frac{1}{4}$ inches in diameter. At 4 inches the tank holds about $3\frac{3}{4}$ gallons and at 7 about $7\frac{3}{4}$ gallons. The best way would be to make a gauge from the illustration in Fig. 2. It will be noted that there are divisions representing inches and others showing gallons. If the gauge shown were inserted into the tank it would register the capacity in gallons and also the height of the liquid. Take a piece of wood about 15 inches long and mark off the divisions exactly as they appear in the illustration, or in other words reproduce the illustration on wood and your gauge is complete. More accuracy may be gained by marking intermediate points.

The Accessory Corner



FIG. 1—NEW REPUBLIC TIRE

Designed for small cars and is offered in three sizes. The material and workmanship is the same as in the Staggard

New Republic Tire

A NEW tire designed especially for light cars, is announced by the Republic Rubber Co., Youngstown, O., the latest candidate for tire honors being known as the W. M. The letters W and M are formed into the tire tread as may be seen from the illustration in Fig. 1. Aside from the tread, the new Republic is the same as the Staggard, the standby of the concern, the material and workmanship being of the same quality. The new tire is offered in three sizes, 30 by 3, 30 by 3½ and 32 by 3½, with the following prices respectively, \$13.50, \$18 and \$19.50.

Coastometer an Efficiency Instrument

Owners of electric vehicles, Coatsometer-equipped, are able to tell, it is claimed,

how much has been saved by coasting, a factor in electric-transportation of goods which is practiced by a number of enterprising railroads operating by electricity. The Coastometer is the product of the Rich-Lindemann Mfg. Co., New York, and its installation on electric vehicles of any type enables the owner to ascertain just how many miles have been run under power and off power. Two readings are given by this instrument, one the total miles run by the vehicle and the other the number of miles coasted. The difference between the two readings gives the number of miles operated under power.

The Coastometer is driven from the front wheel of the vehicle by gears as shown in Fig. 2. It consists of a cylindrical shell in which the indicating mechanism operates. Also contained in this shell is a small magnetic latch which controls the coasting mechanism. This magnet is connected in parallel with the controller of the truck through the leads coming from the instrument, and connected to the steel box shown, which contains a resistance together with two fuses. The box is then connected in parallel with the controller circuit by means of the two wires shown in the center on the top of the illustration. When the current is off the controller circuit, the coastometer circuit also has no current and the latch loses its magnetism, thereby releasing the coastometer mechanism, which then begins to register. The reading may be seen on the bottom row of the instrument.

It hardly is necessary to show that a great saving may be made by coasting at the proper time, but the Rich-Lindemann company has made tests to show exactly

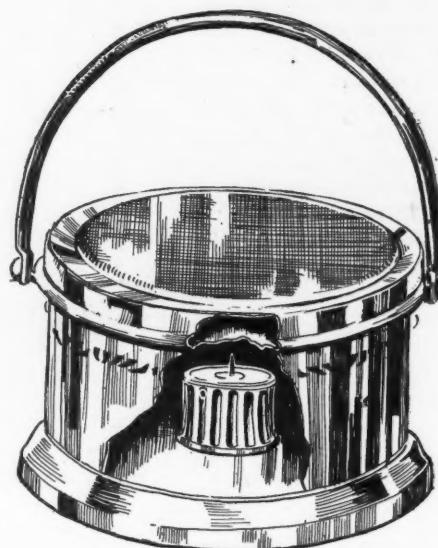


FIG. 3—SAMPSON FOOT WARMER

A composition brick is placed in the warmer and when once lighted is said to burn for six hours

what this saving amounts to and has found in one instance that a 7.5 per cent saving in kilowatt hours was effected. Prominent electric street car companies have taken up the work of efficiency increase due to coasting and a report has been circulated that some of the motormen are paid according to their ability to coast. The greater his coasting mileage the more money he receives.

Sampson Foot Warmer

A seasonable accessory has just been brought out by the American Electric Co., in the form of a foot warmer, which employs composition bricks as fuel. The brick is lighted with a match and once

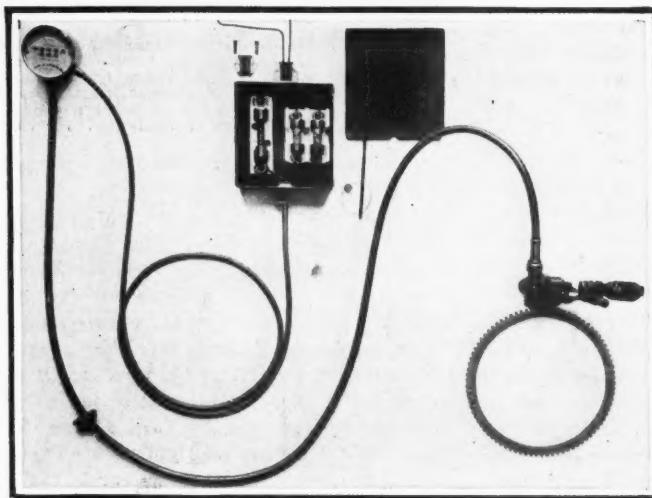


FIG. 2—COASTOMETER INSTRUMENT FOR ELECTRICS

Tells the owner of an electric vehicle the number of miles the car has traveled without power, thus showing the efficiency of the driver and the saving made by coasting

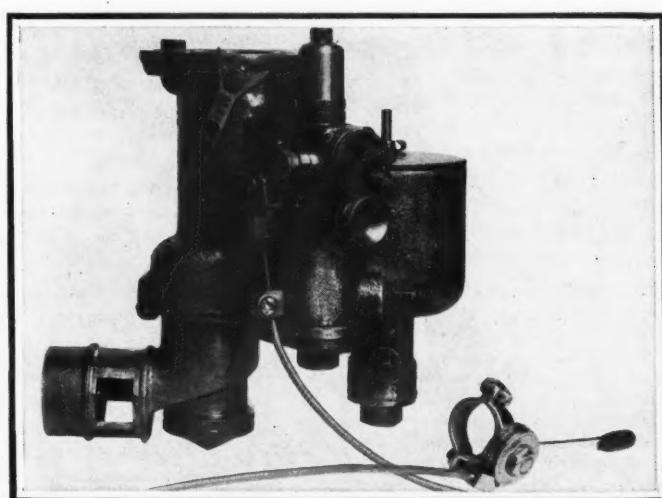


FIG. 4—WHITE KEROSENE CARBURETER

Gasoline is used for starting and kerosene after the motor has warmed sufficiently to take the heavy fuel. Water is fed with the mixture to prevent knocking under load

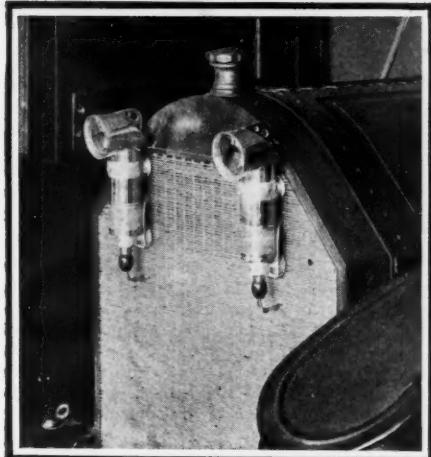


FIG. 5—ROFFY GLARELESS HEADLIGHT

The qualities of this odd-constructed light are dependent upon condensing and projecting lenses and a mushroom-shaped tungsten bulb

burning begins, heat is generated for a period of six without any odor being given off, it is claimed. The warmer is shown in Fig. 3. The cover is held in place flexibly by snaps, so that removal is easy for the replacement of a burned out brick.

White Kerosene Carbureter

White Bros. Co., Mansfield, O., have brought out a kerosene carbureter, illustrated in Fig. 4, which uses gasoline for initial motor starting and kerosene after the motor has warmed. The gasoline for starting is introduced into the carbureter through a hollow needle and then directly to the nozzle where it is drawn into the motor due to piston suction. The motor is permitted to operate a few minutes on gasoline and then the kerosene inlet opened, an adjustment of the kerosene needle valve being provided on the dash of the car.

Two air valves are used as in most carbureters. A feature of the White carbureter is that it feeds water with the mixture automatically to prevent engine knocking when under heavy load. It is claimed that during tests performed by

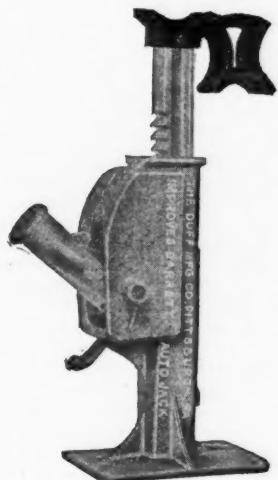


FIG. 6—NEW BARRETT JACK

Known as the folding top and is designed to meet the requirements of cars with axles of different height from the ground



FIG. 7—CLARK SAFETY ENGINE CRANK

The use of this device prevents all injury to the operator caused by motor backfires, it is claimed. The handle may be removed or not as one wishes. Pawls and a bronze ratchet do the work

the maker, the carburetor gave greater motor flexibility and the same mileage per gallon and power as was obtained with gasoline alone as fuel. It is further stated that no carbon deposit results any more than with gasoline.

New Motophone Horn

Giving its Motophone mechanical horn a feature of an electric horn has been accomplished in the introduction, by the Automobile Supply Mfg. Co., Brooklyn, N. Y., of a cable attachment which permits the horn to be operated by push button. The Motophone with attachment is shown in Fig. 8. The price of the large horn with attachment is \$15 and the smallest \$8.

Roffy Glareless Headlight

Illumination without glare is the claim made by the makers of a new form of headlight, known as the Roffy and marketed by the Roffy-Grace Corp., New York. The construction, attachment and appearance of the Roffy light are novel, and as may be seen from Fig. 5. The glareless and at the same time high-illuminating qualities of this light are dependent upon a train of condensing and projecting lenses separated by a mirror. The beam emitted from the Roffy lamp has sharply defined edges and the upper ray never rises higher than the top of the radiator. It is claimed the light emitted is of pure white and permits of road objects being seen clearly. Each lamp consumes 4 amperes at 6 volts. The maker asks \$35 per pair including two bulbs and a series-parallel switch.

Clark Safety Engine Crank

The Clark Crank Co., Muncie, Ind., has brought out a safety crank for motor cars the use of which prevents any injury to the person cranking from motor reversal due to backfiring. The device is simple, depending upon pawls and a bronze ratchet for its work. As shown in Fig. 7 the Clark crank consists of four parts, a handle H made of malleable iron and which contains two steel pawls, a bracket B fastened below the radiator and designed to hold the ratchet container C, and the nut N which holds the handle and ratchet container together. The handle may be removed immediately after the engine has been cranked or it may be left in place.

The Clark company is offering the safety crank in styles suitable for all makes of cars. The crank comes in four finishes, nickel, brass, oxydized or japan, and sells at \$10.

Goodyear Tire Protector

An extra casing which fits over the ordinary tire and is called "A retread while you wait" is offered as the latest product of the Goodyear Tire and Rubber Co. This tire protector may be applied to a new casing, in which event it saves the casing and prevents the possibility of punctures or blowouts because it comes in contact with the usual tire destroyers. The Goodyear protector may be applied also to tires which have seemingly outlived their usefulness, in which case tire life is prolonged.

Barrett Folding Top Jack

The Duff Mfg. Co., maker of Barrett Jacks, announces the folding top type which is designed for meeting the requirements of cars with axles of different heights from the ground. The top of the jack is in two parts, the lower or stationary top and the folding piece which adds 1 or 2 inches to the regular height of the jack. The folding top is shown in Fig. 6.



FIG. 8—NEW MOTOPHONE HORN

The mechanical horn is given the features of the electric by the cable attachment. A push button operates the horn



From the Four Winds



JUSTICE Finds Himself Guilty—When Justice Frank W. Flemsburg, of Hagerstown, Md., was arrested at Hancock for not having the proper lights on his motor car, Constable McAvoy took him to his own office, where the justice tried himself, found himself guilty and fined himself \$3 and costs.

Grant Seeks Car in Europe—Harry Grant, twice winner of the Vanderbilt cup, has gone to Europe with a commission from Paul Zeigler to purchase the fastest motor car he can find on the other side, and will visit Brooklands to note the speed of the Sunbeam and some of the other machines that have been making records there.

Hoosier Highway Body Christened—The Northern Indiana Lincoln Highway Association is the new name for the Indiana division of the Transcontinental Highway Association, which includes members from South Bend, Laporte, Elkhart, Goshen, Mishawaka, Ligonier, Valparaiso, New Carlisle, Hobart and Rolling Prairie, cities and towns in northern Indiana.

Gives \$50,000 to Lincoln Highway—A gift of \$50,000 towards the Lincoln highway has been made by John Stewart of Elburn, Ill., millionaire lumberman and Kane county's wealthiest resident. Recently he spent \$20,000 in constructing a concrete road from the town of Elburn, 3 miles, to his own home. A marker bearing his name will be placed at each end of the section of the Lincoln highway for which he pays.

Motor Club Elects Officers—At the annual election of the Columbus Automobile Club of Columbus, O., held recently, Dr. J. W. Means was elected president; L. M. Browne, first vice-president; P. F. Minnoch, second vice-president; J. E. Walsh, secretary; C. Edward Born, treasurer, and M. A. Pixley, Ralph Hirsch, Harry McCloud, Ira P. Madden, Frank J. Girard, Thomas E. Curtin and Joseph Dierdorff members of the board of trustees.

License Fees Total \$900,000—Estimates of the income from motor car licenses in Pennsylvania for the year 1913 place the figure at \$900,000. More than 80,100 cars of various kinds have been registered and there is considerable curiosity whether the new registration act, taking effect January 1, with its provision for half-year license, will yield as much. Under the license act now in force a license has to be paid for the entire year, but by the new law cars registered at the state highway department after July 1 are registered for one-half of the yearly fee. Four-fifths of the record-breaking registration this year was prior to July 1.

California Dealers to Meet—In an effort to secure concentrated action among men interested in the motor car trade in California on many matters that appear to be in need of correction, a convention of the dealers of the state has been called at Fresno, Cal., for January 8. The initiative in the formation of a state association has been taken by the Fresno Auto Dealers' Association, which has written to over 400 of the other dealers in the state inviting the latter to meet here and discuss the many ills that seem to be in need of a remedy. One of the chief subjects to be discussed will be the matter of freight rates. This applies particularly to tonnage on which they pay a rate of \$3.10 a hundred pounds at the present time. Since this item will run from 400 to 900 pounds per car load and sometimes more, it is a matter of many thousand dollars annually to the larger dealers and will run well into hundreds with

even the smaller ones. Several other matters will be discussed, among them legislation, second-hand cars and their disposal and price cutting.

D. of A. M. to Mark Highway—The Texas Daughters of the American Revolution have completed a fund of \$2,000 for the marking of the proposed King's highway, from Nacogdoches to El Paso by way of San Antonio. The markers will be granite boulders placed at regular distances.

Boston Banquet Date Changed—The annual banquet of the Massachusetts State A. A. is to be held at the Hotel Somerset, Boston, Mass., on January 5 instead of January 15 as originally scheduled, in order that President Wilson of the A. A. A., who is to sail for Europe January 10, may be present.

Cement Posts to Mark Trail—White cement posts, to mark the Cannonball trail between Chicago and Quincy, are being placed in position. At some points, there were interesting ceremonies in connection with the marking. On December 2 at Quincy, a number of addresses were given by prominent citizens. It is desired to have the posts all set before travel is resumed next spring.

Bids for Good Roads Congress—New Orleans feels confident that she will secure the 1914 National Good Roads' Congress. The race, which originally included a dozen of the larger cities, has narrowed to Denver, Atlanta and New Orleans. New Orleans also is a bidder for the annual convention of the American Automobile Association.

Michigan License Law Attacked—Attorney General Fellows of Michigan has rendered an opinion to the effect that motor car owners who pay their license fees under the new law, the constitutionality of which is now before the supreme court, may recover them should the court decide against the state. The sale of tags fell off noticeably after the case was taken to the supreme court. As the court will not decide the case before December 23 at the earliest, the secretary of state feared he could not supply the owners of the state with licenses between that time and January 1. Therefore he asked the attorney general for the opinion that those who paid might be protected should the court decide that the new law, which taxes machines according to their horsepower, is unconstitutional.

\$120,000 for Good Roads Work—Lew G. Ellingham, secretary of state, is preparing to distribute the funds derived under the Indiana motor license law which became effective July 1. The amount that has been collected since that time has been about \$150,000, and after deducting the expenses of the motor license department, amounting to \$30,000, there will be \$120,000 to distribute for good roads work among the counties of the state. The law provides that one-third of the revenue shall be distributed equally among the counties of the state, that one-third shall be divided between the counties according to their respective mileage of free gravel and macadam roads and last that one-third shall be divided in proportion to the amount of license fees each county pays. Noble and Lagrange counties, which have sandy soil, have no free gravel or macadam roads and will get nothing under the road mileage provision. Brown county has but one motor car and two motorcycles, yet will get its share in the distribution, while Marion county in which Indianapolis is located and which has about 7,000 motor cars, will get no more in the

distribution of one-third pro rata among the counties than Brown. There have been about 45,000 motor cars licensed since July 1 of this year.

Dallas Club House Completed—The new clubhouse of the Dallas Automobile Building Association of Dallas, Texas, is nearing completion and will be turned over to the club this week. The approximate cost of the clubhouse has been \$22,000. The structure is one and one-half stories high, built on the bungalow plan, with concrete base.

New Orleans Has Amateur Race—A Cadillac won a 75-mile race at the fair grounds in New Orleans recently; a Speedwell was second and a White Star third. Buick and Marmon cars were leading when put out by a collision. A \$1,000 cash prize went to the winner. Only local amateur drivers were allowed to enter. Other amateur races will be held during the winter in New Orleans.

Club President to Tour Far East—Mr. and Mrs. P. C. Rubush have left Indianapolis for San Francisco, on their way to Hawaii, the Philippines, China and Japan, where they will remain until about May 1. Mr. Rubush is president of the Hoosier Motor Club, Indianapolis, and of the Indiana Automobile Association. Fred I. Willis will be acting president of the Hoosier Motor Club until Mr. Rubush returns.

Motor Over Honeymoon Trail—Mr. and Mrs. Charles Graffin of Catasauqua, Pa., recently made a motoring trip in honor of their fifty-ninth wedding anniversary. They covered the same route taken on their original honeymoon tour, in November, 1854. That time they drove by stage to Easton, went by rail to Trenton, and thence by boat to Philadelphia. Mr. Graffin served two terms as postmaster at Graffin and is 84 years old. His wife is 79.

Big Increase in Registrations—Up to November 30, the close of the fiscal year of the Massachusetts highway commission, 62,660 motor car registrations had been issued, an increase of 12,528 over the corresponding period of 1912. The number issued in 1912 increased 11,285 over 1911, so that in a period of 2 years there has been a gain of 23,753, or 61 per cent, in the number of registrations issued in this commonwealth. The number of persons licensed to operate motor vehicles on November 30 was 81,034, compared with 66,645 in 1912, and 52,325 in 1911. Receipts of the motor car department of the highway commission for the year set a new high mark at \$764,153. The use of commercial vehicles the past few years has been steadily increasing, the total registered during the last fiscal year being 5,948, against 4,036 in 1912 and 2,189 in 1911.

Logs 35,000 Miles of Road—After inspecting and logging thousands of miles of road and accomplishing much in the way of promoting the construction of good roads in the southwest, Colonel A. L. Westgard, vice-president of the National Highways Association of New York, has returned to New York, principally on account of the unfavorable weather which made it impracticable to continue the work. He will return to Texas next spring and work northward as the season advances. Colonel Westgard has been inspecting and examining proposed national highways since June 2, when he left New York City for San Francisco by motor car. From San Francisco he went to Seattle, thence to Denver, Los Angeles, San Diego, Phoenix, El Paso, San Antonio, Corpus Christi, Waco and Austin, inspecting and mapping some 35,000 miles of road.



DAIMLER Expert for Moline-Knight—A. F. Marshall of Coventry, England, formerly a member of the technical force of the Daimler-Knight factory, has been engaged as chief inspector of the Moline-Knight engines by the Moline Automobile Co.

New Lamp Factory Completed—The new plant of the John W. Brown Mfg. Co., located on Marion road, Columbus, O., has been completed and machinery is now being installed. The plant manufactures lamps for the Ford company exclusively.

To Build Cars at Bridgeport, O.—The Bridgeport Auto Co., formed recently, is having plans and specifications prepared for a large plant to be erected at Bridgeport, O., for the making of motor cars. It is said an eastern concern will be merged with the Bridgeport company in the near future.

Capital Increased to \$1,000,000—The Parish and Bingham Co., of Cleveland, has increased its capital stock from \$244,000 to \$1,000,000. The company's factory is at 5363 Hamilton avenue and it manufactures motor car frames and steel stampings. The increase was obtained for the purpose of increasing working capital.

Batavia Rubber Declares Dividend—The Batavia Rubber Co. has declared the regular quarterly dividend of 1.5 per cent on the preferred stock and the regular quarterly dividend of 1 per cent, and an extra dividend of $\frac{1}{2}$ of 1 per cent on the common stock, payable January 1. The books close December 15 and reopen January 5.

Drawback Allowed Studebaker—A drawback allowance has been granted by the treasury department on the exportation of motor cars and aluminum parts exported separately or in combination, manufactured by the Studebaker Corp. with the use of aluminum castings made from imported aluminum by the General Aluminum Castings Co., Detroit, Mich.

Opens Office in Detroit—The Richmond Forgings Corp. of Richmond, Va., maker of drop forgings for motor cars, has opened an office in Detroit in the Dime Bank building with Landon C. Wellford, the company's sales manager, in charge. The company also has arranged with A. O. Knudson of Newton Center, Mass., to look after its New England trade.

Trade Association Elects Officers—Arthur M. Day, of New York, has been elected president of the recently organized Automobile Trade Association of New York. C. D. Hakes, of Albany, was elected vice-president; R. E. Frown, of Buffalo, treasurer, and C. A. Stewart, of New York, secretary and general manager. The following associations were elected to membership: Albany, Buffalo, Rochester, Syracuse, New York, Brooklyn and the Automobile Importers' Alliance.

New Motor Car Guaranty—The Automobile Chamber of Commerce is again struggling with the guaranty question, and this time will endeavor to arrive at a form of guaranty which will serve in the sale of both cars and trucks, at the same time a standardized method of listing the specifications in its yearly handbook. The change that has been made in the standard form of warranty has the effect of making unnecessary the separate forms of guaranty which heretofore have been applied to pleasure and commercial vehicles. The warranty is essentially a revision of the old one, with very little alteration in the wording except that a number of words considered to be superfluous and more

or less confusing to persons not acquainted with the written language of lawyers have been eliminated; it will not be made public, however, until finally approved by the chamber's counsel.

Supplies Parts for Michigan—The Michigan Auto Parts Agency has been organized at Kalamazoo, Mich., and is ready to furnish parts, assembled or in units, that may be required by Michigan car owners. M. D. Wooten, formerly superintendent of the service department of the Michigan Motor Car Co., is one of the organizers of the new concern.

November Crude Rubber Movement—During November 2,130 tons of para rubber were received at Para as compared with 3,221 tons in November, 1912. Para shipments during the last month to Europe totaled 1,630 tons, as compared with 1,010 tons a year ago. The world's visible supply of para at the end of November amounted to 4,620 tons as compared with 4,300 tons in 1912.

Show Exhibitors Number 360—From every standpoint the New York show of 1914 will be greater than its predecessors and particularly so in the number of exhibitors who will display their products. In all there are 360 exhibitors, of which number 76 will show gasoline pleasure cars; 266 will display accessories and parts; twelve will be motorcycle exhibits and six will be displays of electric vehicles. Motor cars will occupy the first and second floors of the Grand Central Palace and all the wall spaces of the third

floor. Electric cars will be shown on the second floor, while accessories and motorcycles will be shown on the fourth floor. There will be accessory exhibits on the third floor also.

Tire Plant Nearing Completion—The plant of the S. and M. Tire and Rubber Co., of Coshocton, O., is nearing completion and machinery is being installed. It is expected to have the plant in operation by the first of the year.

Takes Over Horn and Vaporizer—The Johns-Manville Co. of New York has taken over the sales rights for the Arnold electric vaporizer and heating plugs, manufactured by the Arnold Electric Co., and the Long horn, made by the G. Piel Co. of Long Island City. In taking over the sale of the latter accessory, the Johns-Manville Co. announces a retail price reduction on the J-S model to \$10 and a horn for Ford cars to be marketed soon.

New Chairman of Research Committee—David L. Gallup, professor of gas engineering at Worcester Polytechnic Institute and consulting engineer in matters pertaining to motor cars for the Boston fire department, has accepted an appointment as chairman of the research committee of the Society of Automobile Engineers. This committee now is composed of some of the best known college and university instructors in the United States, among them being Professor R. C. Carpenter of Cornell; Professor C. F. Lucke of Columbia and Professor H. F. Thompson of Massachusetts Institute of Technology.

Recent Incorporations

Albany, N. Y.—Mack Motor Truck Co., capital stock, \$10,000; incorporators, A. J. Cook, W. A. Hamilton, M. C. Fitzgerald.

Attleboro, Mass.—Bristol Motor Car Co., capital stock, \$3,000; directors, John H. Nerney, A. B. Brunell, E. E. DeLorme.

Boston, Mass.—Stutz Motor Car Co., capital stock, \$30,000; incorporators, M. P. Chase, M. F. Chase, G. E. Kimball.

Brooklyn, N. Y.—Empire Postal Motor Co., capital stock, \$10,000; incorporators, C. J. Gillem, R. W. Kathan, A. M. Kathan.

Brooklyn, N. Y.—Inter-State Accessories Corp., motor car parts; capital stock, \$2,000; incorporators, L. Kauffman, S. M. Kohn, A. Strauss.

Buffalo, N. Y.—Hurd-Landsheft Motor Co., capital stock, \$7,500; incorporators, M. J. Hurd, C. M. Hugo, R. Landsheft.

Cleveland, O.—Dunham Motor Co., capital stock, \$10,000; to deal in motor cars; incorporators, C. W. Rush, G. K. Wadsworth, H. A. Mullin, L. A. Dunham, T. S. Dunlap.

Cleveland, O.—Lea Oil Co., capital stock, \$15,000; to manufacture oils; incorporators, E. E. Stuyvesant, H. B. Stuyvesant, A. B. Lea, S. G. B. Lea, H. E. Parsons.

Cleveland, O.—Lincoln Motor Van Co., capital stock, \$1,000; to engage in transportation business; incorporators, L. A. Kujausk, G. Suhm, P. E. Paukuch, D. D. Hurlbert, H. M. Calvert.

Columbus, O.—Guaranty Service Truck Co., capital stock, \$12,000; to repair and taxicab business; incorporators, W. H. Klunk, W. G. Brewer, G. F. McDowell, J. M. Borst, R. A. Nichols.

Columbus, O.—Direct Drive Axle Co., capital stock, \$10,000; to manufacture and deal in axle transmissions; incorporators, W. E. Campbell, C. O. Haines, C. T. Phillips, I. H. Pleukharp, H. B. Gilchrist.

Detroit, Mich.—Parrett-Barbour Motor Sales Co., capital stock, \$10,000; incorporators, W. L. Parrett, H. J. Latour.

Eastport, Me.—Eastport Garage & Supply Co., capital stock, \$10,000; directors, S. S. Frost, J. H. Frost.

Elmhurst, N. Y.—Lemmy Garage, capital stock, \$2,000; incorporators, C. A. Burr, E. A. Dietze, J. J. Pheelan.

Greenfield, Mass.—Weldon Garage, capital stock, \$5,000; directors, George W. Wilcox, W. H. Gould, W. A. Davenport.

Hackensack, N. J.—Feakes Garage, capital stock, \$25,000; to deal in motor cars; incor-

porators, H. E. Feakes, L. N. Blair, J. Schnelder.

Hartford, Conn.—Buick Taxicab Co., capital stock, \$25,000; incorporators, A. C. Bieber, F. H. Bieber, D. Roberts.

Milwaukee, Wis.—Western Motor Supply Co., capital stock, \$15,000; to deal in tires; incorporators, R. F. Coerper, L. Conne, R. L. Tietbohl.

Newark, N. J.—Mechanical Auto Tube Co., capital stock, \$100,000; to manufacture tires; incorporators, B. F. C. Rothwell, W. B. Estes, F. F. Estes.

New York—Convertible Automobile Body Corp., capital stock, \$250,000; to manufacture and deal in motor car bodies; incorporators, L. Lewkowitz, E. I. Gottlieb, M. Kaplan.

New York—Wiese & Co., capital stock, \$25,000; to manufacture upholstery for motor cars; incorporators, W. Wiese, C. Wiese, A. Maertens.

New York—Packard Acme Garage, capital stock, \$5,000; incorporators, E. Beugnet, G. Posner, S. S. Levine.

New York—M. J. L. Rear Adjustable Bumper, capital stock, \$1,000; incorporators, M. J. Leclerc, S. Solinsky, H. Stern.

Ossining, N. Y.—Higrade Body-Building Co., capital stock, \$5,000; incorporators, J. B. Tillotson, J. A. Cuff, R. W. Yates.

Racine, Wis.—Reliance Automatic Lighting Co., capital stock, \$10,000; incorporators, B. F. Fliegle, E. B. Hand, F. H. Fliegle.

San Francisco, Cal.—San Francisco Auto Truck Co., capital stock, \$100,000; to manufacture trucks; incorporators, J. A. Keenan, W. A. McLeod, H. Harrington, H. B. Barbee, J. P. McDonnell.

Seattle, Wash.—Automobile Funding Co., capital stock, \$500,000; incorporators, F. W. Clay, C. A. Bradley.

Syracuse, N. Y.—Sagamore Motors Corp., capital stock, \$75,000; general motor car business; incorporators, J. S. Brown, C. G. Hanna, E. W. Lawton.

Toledo, O.—Toledo Auto Cycle Car Co.; to manufacture cycle cars; incorporators, E. P. Severcool, W. L. Vall, W. C. Carlyle.

Toledo, O.—Silent American Motor Co., capital stock, \$10,000; to manufacture and deal in gasoline motors; incorporators, S. F. Sawyer, J. R. Ford, W. G. Kirkbride, H. C. Crane, E. H. Reed.

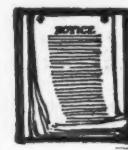
Wilmington, Del.—Utility Motors Corp., capital stock, \$100,000; incorporators, W. J. Maloney, H. E. Latterand, O. J. Reichard.

Wilmington, Del.—Auto-Coach Co., capital stock, \$300,000; to manufacture and deal in motor cars; incorporators, H. E. Letter, W. J. Maloney, O. J. Reichard.

Wilmington, Del.—Utility Motors Corp., capital stock, \$100,000; to manufacture and deal in motors; incorporators, W. J. Maloney, H. E. Letter, O. J. Reichard.



Brief Business Announcements



COLUMBUS, O.—The Potts-Rine Supply Co., of Columbus, dealers in motor car supplies, has changed its name to the Potts-Seider Supply Co.

Columbus, O.—The Wagenhals Sales Co. is the name of a new concern organized at Columbus for the handling of the Wagenhals motor delivery wagons. W. O. Chaffee is manager.

Milwaukee, Wis.—R. D. Mitchell, Wisconsin distributor of the Gray pneumatic gear-shift and engine starter, has established general offices at 406 Free Press building and a service and installation station at 138 Sixth street.

Columbus, O.—W. S. Sherwood, who has been connected with the J. C. Sherwood Rubber Co. at Fourth and Chestnut streets, Columbus, O., for the past 4 years, is now proprietor of the Franklin Rubber Co. at 265 North Fourth street.

Columbus, O.—L. L. McGuire has located a repair shop for speedometers at 138 East Spring street, Columbus, O. Mr. McGuire spent 5 years in the Stewart-Warner factory and makes a specialty of repairing and adjusting speedometers.

Milwaukee, Wis.—E. B. Leverenz, 930 Third street, Milwaukee, has disposed of his garage and agency business to Joseph J. Thor of Milwaukee, who will continue the business at the same location. Mr. Leverenz was distributor for the Pullman.

Milwaukee, Wis.—The Cyclecar Sales Co., of Milwaukee, representing the Imp cyclecar, has opened a garage and salesroom in the Chacona building, 803-805 Grand avenue, formerly occupied by R. D. Rockstead. This is the first cyclecar garage and agency in Milwaukee.

Chicago—Joseph R. Power, who has had charge of the wholesale business of the Anderson Electric Car Co. for the past 3 years in Illinois, has taken the position of district manager for this same territory, including Indiana and Wisconsin, for the Chicago Electric Motor Car Co., with headquarters in Chicago.

Dallas, Texas—The Shelor-Morris Automobile Co. is the latest addition to motor car concerns in Dallas. Mr. Shelor for many years was connected with the United Motor Dallas Co. and only recently resigned as district manager of that company. Mr. Morris has had considerable experience in handling cars and accessories in Dallas. The new company will handle the Velle pleasure cars and trucks, and salesrooms have been opened at 2219 Commerce street.

Milwaukee, Wis.—As a direct result of the Goodyear fire, which recently caused a total loss of \$600,000 to several concerns, including the Goodyear Rubber Co., 384-386 East Water street, Milwaukee is to have three rubber companies, which will also act as tire distributors. The Goodyear company is now in temporary quarters on East Water street, one block south of the former site, and contracts are about to be awarded for the construction of a six or eight-story building on the old site. Victor M. Stamm, who was manager of the tire department of the Goodyear company, state distributor for the G. & J. brand of U. S. tires, has resigned and will be manager of the new Milwaukee branch to be established by the Hubmark Rubber Co., of Boston. Harold D. Detienne, for several years with the Goodyear company's Milwaukee house, has also resigned to establish the Wisconsin Rubber Co. in Milwaukee. James Suydam, district manager of

the Goodyear company, with headquarters in St. Paul, is in charge of the Milwaukee store at present.

Bristol, Conn.—At a recent meeting of the stockholders of the New Departure Co., of Bristol, Conn., it was voted to increase the capital stock of the company by \$500,000.

Bucyrus, O.—L. R. Sponseller has sold his repair shop and garage on South Poplar street, Bucyrus, O., to Kroegel and Parsel Bros., of Crestline. Mr. Sponseller retains his taxicab and livery business.

Kenosha, Wis.—The extension of the foreign business of the Thomas B. Jeffery Co., Kenosha, Wis., to South Africa has just been brought about by the conclusion of arrangements for representation in that part of the world by A. E. Flavell, of Cape Town.

St. Louis, Mo.—F. H. Casebeer, formerly manager of the Oklahoma City, Okla., branch of the Goodyear company, has been named to succeed John A. Maroney who last week was promoted to manager of the carriage-tire department of the Goodyear firm at Akron, O. M. H. Parsons remains as district manager with headquarters here.

Fenton, Mich.—A company has been formed at Fenton, Mich., for the manufacture of a cyclecar and as Secretary W. H. King has been assured of substantial aid by the city council, it is possible that the factory may be established there. O. J. Howick, formerly with the Lozier and Packard companies of Detroit, is the designer and builder. The

Coming Motor Events

SHOWS, CONVENTIONS, ETC.

December 11-20—First International Exposition of Safety and Sanitation, New York city, American Museum of Safety.

January 2-10—Importers' Automobile Salon, Hotel Astor, New York.

January 3-10—New York show, Grand Central palace.

January 4-8—S. A. E. meeting, New York.

January 5-10—Show, Los Angeles, Cal.

January 10-16—Milwaukee, Wis., show.

January 10-17—Philadelphia show.

January 10-21—Show, Cleveland, O.

January 10-21—Show, Brussels, Belgium.

January 12-17—Show, Bridgeport, Conn.

January 17-24—Show, Detroit, Mich.

January 24—February 7—Show, Montreal

Can.

January 24-31—Rochester, N. Y., show.

January 24-31—Chicago show.

January 26-31—Scranton, Pa.

January 31—February 7—Minneapolis show.

February 2-7—Buffalo passenger car show.

February 3-7—Show, Kalamazoo, Mich.

February 4-7—Show, St. Joseph, Mo.

January 5-10—Show at Los Angeles, Cal.

February 9-14—Buffalo truck show.

February 9-14—Show, Grand Rapids, Mich.

February 16-21—Kansas City show.

February 18-21—Bloomington, Ill., show.

February 21-28—Newark, N. J.

February 22—March 5—Cincinnati, O.

February 23-28—Omaha show.

March 2-4—Cincinnati commercial car show.

March 2-6—Show, Ft. Dodge, Ia.

March 7-14—Boston passenger car show.

March 9-14—Show at Des Moines, Ia.

March 17-21—Boston truck show.

February 21-28—Cincinnati passenger car show.

CONTESTS

May 30, 1914—Indianapolis 500-mile race.

July 25-26—Belgium grand prix road races.

February 21—Vanderbilt cup race, Santa Monica, Cal.

February 23—American grand prix, Santa Monica, Cal.

July 4—French grand prix, Lyons.

new car has a twin-cylinder, four-cycle, air-cooled motor of 13 horsepower capacity. It has electric lights.

Milwaukee, Wis.—L. P. Dorsett has succeeded John McDonald, Jr., as manager of the McDonald Motor Car Co., 239-241 Wisconsin street, distributor of the Lozier. Carl G. Pauli is president of the company.

Cleveland, O.—B. G. Margeson and F. A. Frizell recently purchased the Quiggle Auto Co. at 750 East One Hundred and Fifth street and have installed equipment and extended the enterprise to double the business.

Columbus, O.—The Herreshoff Motor Co., of Columbus, recently incorporated with a capital of \$5,000, has located a sales room at 186 East Fourth avenue. The concern will have twenty-four counties in central Ohio for the Herreshoff.

Boston, Mass.—George J. Dunham, formerly president of the Royal Tourist Co. and a former Boston agent for that car, is again in Boston, having been made manager of the J. H. MacAlman Motor Car Co., agents for the Stearns-Knight.

Fort Atkinson, Wis.—The garage and agency business of C. G. Monckmeier at Fort Atkinson, Wis., has been purchased by Damp Bros., of Lake Mills, Wis. Mr. Monckmeier is well known as a Staver driver in races and reliability tours. He intends to return to Chicago.

Los Angeles, Cal.—Phineas Jones & Co., of Newark, N. J., motor car wheel manufacturer, has opened a local branch factory at 1625 South Los Angeles street, incorporated under the name of Phineas Jones & Co., of California. The business will be under the management of H. Percy Jones.

Milwaukee, Wis.—E. F. Schoene, Jr., has disposed of his interest in the Auto Lamp and Radiator Co., Milwaukee, and the reorganization is officered by M. E. Kingsley, president; S. Holny, vice-president, and H. A. Gathmann, secretary and treasurer. The company has works and offices at 186-188 Fifth street, and is state agent for Guide lamps.

Kalamazoo, Mich.—C. L. Smith, of Kalamazoo, and M. H. Smith, of Three Rivers, Mich., have filed papers to form a company for the manufacture of an anti-freeze solution to resist low temperatures. C. L. Smith, who is a chemist, has been engaged for years in work on an anti-freeze solution that will harm neither metals nor rubber and will not freeze in a temperature of from 20 to 40 degrees below zero.

Milwaukee, Wis.—The Hickman-Lauson-Diener Co., Wisconsin distributor for the Ford, has leased temporary quarters in the Masco Garage at Chestnut and Seventh streets, Milwaukee, until its garage and service building at 137-143 Eighth street, badly damaged by fire recently, is rebuilt. Slight inconvenience has resulted from the fire, as the Ford company maintains a large assembling plant in Milwaukee.

St. Louis, Mo.—Nathan H. Hall, member of the lower house of the municipal assembly from the twenty-third ward, St. Louis, Mo., has been notified by the patent office at Washington that his model for a new transmission and steering gear for motor-driven vehicles has been patented. According to Hall, the device has undergone many tests and has been approved by Charles Swingley, St. Louis fire chief, who believes the device is adopted peculiarly to fire fighting apparatus driven by motor. The steering gear arrangement permits the use of the "cut

under" front bodies on vehicles. The "fifth" wheel is used in the adaption of Hall's invention.

Boston, Mass.—The John V. Wilson Co., of Boston, has taken on the agency for the A. V. Shock absorber, made abroad, and will market it in the New England territory.

Portland, Ore.—A new concern known as the Northwest Chevrolet Motor Car Co., has taken quarters in the new Keats Building in Portland. A. L. Smith, formerly located in Chicago and California, heads the new concern.

Madison, Wis.—The L. F. Schoellkopf Motor Co., western Wisconsin distributor for the Ford, has established an assembling plant at the foot of West Wilson street to facilitate deliveries. A garage and service station has also been established at 114 East

Wilson street. The original garage at 116 South Pinckney street, Madison, is now used exclusively for salesrooms and offices.

Milwaukee, Wis.—The Babcock Automobile Spring Co. has been organized at Milwaukee by R. F. Babcock, who has established a shop and office at 187 Oneida street.

Milwaukee, Wis.—The Kemco electric generator will be distributed in the Wisconsin territory by the Kemco Electric Sales Co., which has established offices and salesrooms at 454 Jackson street, Milwaukee.

Philadelphia, Pa.—At the recent meeting of the Philadelphia Automobile Trade Association, Louis C. Block was again elected president for the third successive term. Other officials chosen were W. P. Herbert, vice-president, and J. E. Gomery, secretary and

treasurer. Louis C. Block, W. P. Herbert, J. E. Gomery, E. C. Johnson and F. E. Devlin constitute the board of directors.

Boston, Mass.—M. E. Brackett has been appointed manager of the Boston branch of the General Motors Truck Co. to take the place of J. L. Morris, who resigned a few weeks ago.

Cashton, Wis.—John Mashak, of Cashton, Wis., has awarded contracts for the construction of a fireproof garage building, 50 by 100 feet in size. It will contain a completely equipped repair shop.

Fond du Lac, Wis.—The Fond du Lac Auto Co. succeeds to the business of the Fond du Lac Auto and Tire Repair Co., 210-212 South Main street, Fond du Lac, Wis. The new owners are W. H. Collins and Harry Treleven. Rush H. Lee was formerly owner.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Abercrombie, N. D.	J. P. Johnson	Maxwell	Manistique, Mich.	E. J. French	Maxwell
Alcaster, S. D.	Henry Ring	Maxwell	Menomonie, Wis.	Menomonie Garage	Maxwell
Augusta, Ga.	Walker & Ivey	Maxwell	Mason, Tex.	Gresham & Logan	Bulck
Athens, O.	J. L. Ravenscroft	Maxwell	Mancelona, Mich.	Burt Wright	Meteor
Altoona, Pa.	H. L. Stultz & Brother	Maxwell	Milwaukee, Wis.	Jesse A. Smith Auto Co.	Maxwell
Albany, N. Y.	Park Garage Co.	Kisselkar	Missoula, Mont.	Chicago Garage	Maxwell
Atlantic City, N. J.	Victor Garage	Kisselkar	Milwaukee, Wis.	Rhode Automobile Co.	Maxwell
Bamberg, S. C.	D. Fowling	Maxwell	Newfoundland, N. J.	F. A. Hoagan	Maxwell
Boston, Mass.	Century Electric Co.	Century	Newberry, S. C.	Summer's Garage	Maxwell
Binghamton, N. Y.	Frank W. Van Antwerp	Maxwell	Negaunee, Mich.	Charles E. Kirkpatrick	Maxwell
Barre, Vt.	H. F. Cutler	Maxwell	Nashville, Mich.	A. E. Bassett	Maxwell
Bakersfield, Cal.	Bakersfield Garage & Auto Supply Co.	Oakland	North Adams, Mich.	J. M. Williams	Maxwell
Bangor, Me.	S. L. Crosby Co.	Maxwell	New Prague, Minn.	Tuma & Hanzel	Maxwell
Bellefonte, Ill.	A. Wangelin	Chandler	Nashville, Tenn.	Lawrence & Sons	Moon
Belleville, Ill.	A. Wangelin	Overland	Ottoman, Va.	L. B. Cottingham	Maxwell
Baron, Wis.	P. O. Solie & Sons	Maxwell	Omaha, Neb.	Opper-Van Vleet Auto Co.	Kisselkar
Clarksburg, W. Va.	Ransome Auto Co.	Maxwell	Olean, N. Y.	Lester & Thomas	Kisselkar
Centerville, S. D.	Nels Lind	Maxwell	Pembina, N. D.	G. G. Thompson	Maxwell
Carrollton, Ill.	Casey & Fishback	Maxwell	Parkersburg, W. Va.	Rutan Auto Co.	Maxwell
Charlotte, Mich.	Donovan, Son & McCormick	Maxwell	Pond Creek, Okla.	F. J. Gentry	Maxwell
Charlotte, Mich.	Donovan & McCormick	Maxwell	Pikeville, N. C.	Pikeville Garage & Motor Co.	Maxwell
Constantine, Mich.	E. T. Severson	Maxwell	Providence, R. I.	Nock Auto Co.	Kisselkar
Commerce, Tex.	P. W. Maloney	Maxwell	Pomona, Cal.	Trusdon Clark	Oakland
Clifton, Tex.	T. C. Grimland	Maxwell	Phoenix, Ariz.	Edward Rudolph	Kisselkar
Cameron, Wis.	Northern Motor Sales Co.	Maxwell	Philadelphia, Pa.	Gibbons-Wetherill Service Co.	Maxwell
Center, Tex.	B. C. Armstrong	Maxwell	Port Jervis, N. Y.	Rutan Auto Co.	Maxwell
Cortland, N. Y.	T. E. Dye & Son	Kisselkar	River Rouge, Mich.	A. J. Polk and H. L. Nieman	Maxwell
Colton, Cal.	Fred O. Lewis	Oakland	Rib Lake, Wis.	George F. Braun	Maxwell
Columbus, O.	G. L. Sitzgreaves	Imp	Reed City, Mich.	Theodore Schmidt	Buick
Cleveland, O.	Harry L. Wilkinson	Imp	Rosedale, Tex.	J. C. Lockhart	Moon
Columbus, O.	P. H. Rogers	Haynes	Rhinelander, Wis.	Onleda Garage Co.	Moon
Centralia, Ill.	Roemer Motor Co.	Reo	Santa Barbara, Cal.	John S. Catlin	Marion
Columbia, Mo.	W. C. Pearman	Locomobile	Santa Barbara, Cal.	John S. Catlin	Marathon
Chillicothe, Mo.	B. F. Brogels	Locomobile	Sandusky, O.	George J. Bling	Oakland
College Corner, O.	Charles Kirkpatrick	Maxwell	San Diego, Cal.	P. M. Price	Kisselkar
De Land, Fla.	Gordon Garage Co.	Maxwell	Shreveport, La.	Lowe & Fiese	Kisselkar
Delano, Minn.	P. W. Pergman	Maxwell	Seattle, Wash.	Metropolitan Car Co.	Kisselkar
Doublin, Ga.	J. B. Burch & B. A. Hooks	Maxwell	Sioux Falls, S. D.	A. L. Barth	Oakland
Evans City, Pa.	Wahl Motor Car Co.	Maxwell	Sioux City, Ia.	C. E. Daily	Oakland
Emery, S. D.	H. M. Bleeker	Maxwell	Shrewsbury, N. J.	J. R. King	Maxwell
Ellsworth, Wis.	A. H. Struve	Maxwell	Schenectady, N. Y.	Chris C. Kehoe	Maxwell
Everett, Pa.	A. M. Karns & Son	Maxwell	Sheffield, Ala.	J. H. Lester Auto Co.	Maxwell
El Paso, Tex.	Richardson Motor Car Co.	Packard	Swissvale, Pa.	Swissvale Motor Car Co.	Maxwell
Elberton, Ga.	Bond & Maxwell	Maxwell	Saginaw, Mich.	Mutscheller Brothers	Maxwell
Flint, Mich.	Fowler Garage	Maxwell	St. Johns, Mich.	Lee Kellam	Maxwell
Fredericks, Del.	W. W. & S. L. Wilson	Maxwell	Springville, Pa.	C. H. Young	Maxwell
Franklin, Mich.	Dr. F. D. German	Maxwell	Suttons Bay, Mich.	John A. Ott	Maxwell
Foley, Minn.	Varner Brothers	Maxwell	Scranton, Pa.	P. J. Needham	Maxwell
Fargo, N. D.	More Brothers	Maxwell	Saylorburg, Pa.	S. Clarence Newhart	Maxwell
Grand Island, Neb.	Matt Jarvis Auto Co.	Maxwell	Stamford, N. Y.	W. D. Thompson	Maxwell
Grand Rapids, Mich.	Robert Willey Auto Co.	Maxwell	Sioux Falls, S. D.	Hessenius Auto Co.	Maxwell
Green Bay, Wis.	Lewis E. Conley	Maxwell	State College, Pa.	State College Transportation Co.	Maxwell
Gulfport, Miss.	Horton W. Jones	Maxwell	Toledo, O.	Landman-Griffith Co.	Lozier
Granite City, Ill.	L. Kaltenbach	Henderson	Toledo, O.	H. E. Throne	Mitchell
High Point, N. C.	Central Auto Co.	Maxwell	Toronto, Can.	W. H. Pearson	Pullman
Henry, Ill.	Phillips & Lucas	Maxwell	Troy, N. Y.	Ilium Garage	Maxwell
Hillsboro, Wis.	James Helak	Maxwell	Terrell, Tex.	T. L. Seitzler	Maxwell
Harbor Beach, Mich.	Dell McMan	Maxwell	Tripp, S. D.	Geidd Case & Co.	Maxwell
Howard City, Mich.	A. B. Potts	Maxwell	Topeka, Kans.	Independent Auto Co.	Maxwell
Hinesville, Ga.	J. B. Way & Son	Maxwell	Tallula, Ga.	Tallula Auto Co.	Maxwell
Huntington, W. Va.	Stevenson & Taylor	Maxwell	Temple, Tex.	Temple Motor Car Co.	Maxwell
Hugo, Okla.	C. A. Thompson	Maxwell	Trenton, N. J.	Toman Brothers	Maxwell
Ironton, O.	F. A. Marting	Maxwell	Unionville, Mich.	C. H. Geyer	Maxwell
Jasper, Minn.	Jasper Auto Co.	Maxwell	Uplands, Cal.	Doner & Wilson	Oakland
Jasper, Ind.	Roettger & Sendelweck	Maxwell	Valley Park, Mo.	A. Stigerwald	Dorr
Kearner, Neb.	Wort & Minton	Maxwell	Valparaiso, Ill.	Haart-McKinlay & Co.	Kisselkar
Kenyon, Minn.	F. G. Held	Maxwell	West Sunbury, Pa.	W. P. Hilliard & Sons	Kisselkar
Litchfield, Mich.	R. H. McKenzie	Maxwell	Webster City, Ia.	Buell & Co.	Kisselkar
Lansing, Mich.	Wolverine Auto Co.	Maxwell	Weatherford, Tex.	E. & L. Garage	Maxwell
Langdon, N. D.	McLaughlin & Stranger	Maxwell	Woodbine, Ia.	Tague Brothers	Maxwell
Lewiston, N. J.	Lewis Yerkes	Maxwell	Wisner, Neb.	West Brothers	Maxwell
Lisbon, N. D.	J. C. Hyde	Maxwell	Walnut Grove, Minn.	F. W. Schauer	Maxwell
Lyons, France	Mons A. Merthan	Pullman	Wausa, Neb.	Otto Hult	Maxwell
Laurium, Mich.	S. F. Dupont	Maxwell	Vidalia, Ga.	E. L. Meadows	Maxwell
Lebanon, O.	John Law & Son	Maxwell	Waco, Tex.	Garrett Hardware & Imp. Co.	Maxwell
Lincoln, Neb.	H. E. Stockdale	Oakland	Walled Lake, Mich.	G. E. Dickerson	Maxwell
Madison, Ind.	Stacy & Maddox	Maxwell	Wellsville, O.	Wellsville Auto Co.	Maxwell
Manhattan, Kans.	J. C. Schafer	Maxwell	Zeeland, Mich.	Lamer Brothers	Maxwell
Monessen, Pa.	Lion Motor Sales Co.	Maxwell			

COMMERCIAL CARS

Edwardsville, Ill.	Tuxhorn Brothers	Palmer	Seattle, Wash.	Broadway Automobile Co.	Elwell-Parker
Milwaukee, Wis.	Creek Motor Sales Co.	Federal	Toledo, O.	Bunnell Auto Sales Co.	Commerce
Philadelphia, Pa.	Bartlett Garage	Kelly-Springfield	York, Pa.	T. S. Pfeiffer	Autocar

The Motor Car Repair Shop

Making Simple Shop Tools

LEON D. SHIRLEY, a Kalamazoo reader of Motor Age, has designed two simple shop tools, a valve spring lifter and a valve grinder, both of which may be made at slight cost and in a short time. The valve lifter is illustrated in Fig. 1. That part lettered A is made 1 by $1\frac{1}{2}$ by 18 inches long. A slot is marked and cut so as to take the links of an ordinary bicycle chain. The slot on A and B should be as long as the material permits without weakening it to any extent. The bicycle chain is held by the pin E. The set screw D is designed to set in the center of the valve when the plug is removed. The fork-shaped portion of the part B is placed under the valve spring and the lip into which D fits grasping some part of the valve chamber. In this way the valve is kept down and the spring may be lifted.

Another device which is offered is a valve-grinding tool illustrated in Fig. 2. Part A is a piece of an old drill rod, the upper end being shaped to fit an ordinary brace. The end is slotted as shown and a hole drilled for the insertion of a pin, shown in the detail as P, which may be a small clevis pin fitted with a cotter pin. Part B is of steel of the dimensions shown. The slotted end of A fits over B and the pin inserted through both. The size of B will depend upon the size of the valve, and in some instances will not suit requirements, but to facilitate matters a number of different-sized parts such as B may be made and used when necessary.

Oil Above the Piston Rings

Not a few owners state their grievance as excessive smoke due to the lubricant making its way above the piston rings and supplement their complaint by saying that only recently new rings were fitted. That new rings were fitted is no indication that the motor should not be smoky. How were the rings fitted? Should the rings bind on one side in the groove and the other side compress, there is a space left for oil to get past that ring. If the rings were replaced with the ends in line, the oil no doubt will get to the piston top onto the spark plugs and thus cause smoking and fouling.

Piston rings to give good service should be lapped-in. This process consists in grinding the ring on a level metal plate previously sprinkled with emery dust and water. A block of wood is placed over the rings and the ring carried back and forth on its side across the emery. When fitted it should move around freely in its guide and yet not show any up or down play. The ends should not touch, the usual clear-

Making Simple Shop Tools

ance at this point being .015 inch, but this varies with different makes of motors. Although the pistons may be true and the rings fitted correctly, a worn cylinder may cause excessive clearance and thus permit oil to get above the rings.

Common Battery Ailments

Excess sulphation results in a battery showing a high charging voltage and a low acid gravity and the capacity is much below normal. Such a condition results if a battery is not charged properly or permitted to stand idle for any length of time.

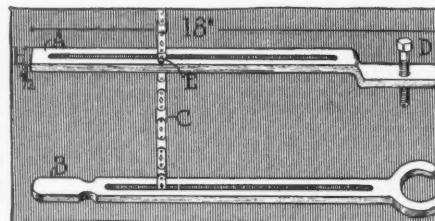


FIG. 1—SIMPLE VALVE SPRING LIFTER

Two pieces of steel shaped as shown are slotted to take an ordinary bicycle chain. The method of operation is given in the text

Over-sulphation is reduced somewhat by overcharging, the rate depending upon the condition of the battery. Such care must be taken in curing a battery of excess sulphation that the work should be done only by an expert.

Broken, corroded or loose connections should be watched for about once a month, and, of course, when a battery begins to show low capacity, or perhaps delivers no current. The connections sometimes burn, thus disconnecting the battery from the circuit and the motor will then stop if the battery is supplying the ignition current. Any wire connection will do temporarily, but at the first opportunity the conventional lead joint should be applied. If the connections are corroded, they should be cleaned by scraping. Corroded posts increase the resistance of the circuit.

Defective plates hardly are to be de-

tected by a novice; in fact, it is a difficult matter to ascertain how badly a plate is worn or defective unless closely examined by a person familiar with the work. This condition is hastened by excessive overcharge and by high temperature of the plates. There is a little wear on the plates at every charge and discharge, but not enough to cause poor battery performance. Watch the temperature when charging, do not overcharge excessively, do not permit sediment to deposit in the jars, prevent excessive sulphation due to either too high density of the electrolyte or high temperatures.

Loose connection result in a loss of electrical power and power costs money, hence it is wise to examine all connections as frequently as possible.

Above all keep the plates covered with electrolyte at all times. Each week during the summer and each 2 weeks during the colder weather the battery should be inspected for low electrolyte. Distilled water costs less than battery plates.

Some Timely Hints

Almost any salt will lower the freezing point of water, so if one happens to stop the motor unexpectedly on a cold night, the introduction of common salt or any other salt into the radiator will lessen the chances of the water freezing. The solution, however, should be drained at the first opportunity, as rusting of the jackets is hastened by its presence.

One owner recently devised a means of passing an electric current through the jacket water which had been made saline, and thus generated enough heat to keep the water from freezing. It is a question whether this method is superior to the use of a good anti-freeze compound, as the current cost in the end may be greater than the cost of the compound.

It is customary in cold weather to change the lubricating oil of the gearset and differential. The heavier grade used during the summer and fall, although a good lubricant, is not as well suited for winter work as thin oil. The cold usually thickens the thin oil, and should very heavy oil be used the cold may make it pasty almost.

Copper filings as material for doing temporary welding has been found efficient. A water jacket crack may be repaired by placing the filings in the opening and playing a torch flame upon them. The flux to be used is made of rosin dissolved in alcohol. It is not advised that such a repair be considered permanent.

Paste stove polish when spread on the threads of cylinder plugs insures against gas leakage.

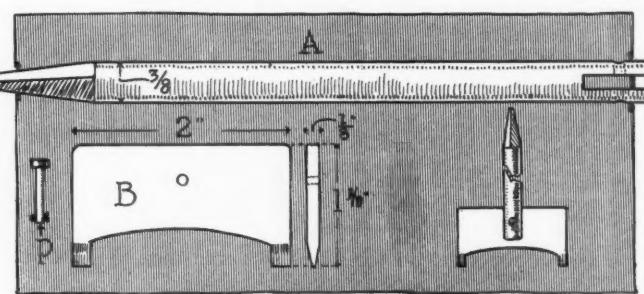
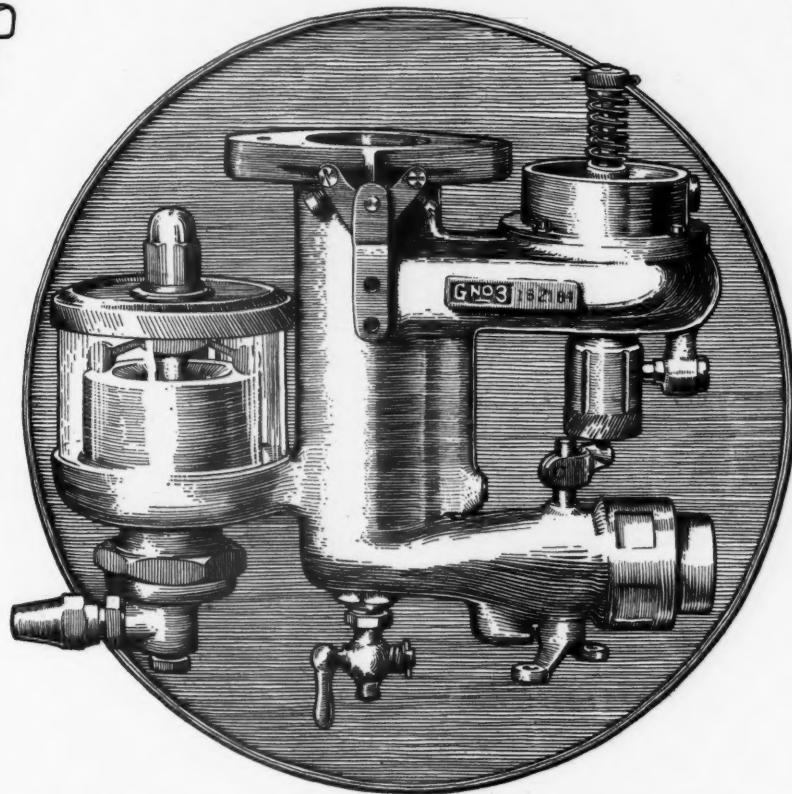


FIG. 2—VALVE GRINDING TOOL

The removal portion B may be made in a number of different sizes to accommodate various valves. An old drill rod slotted at its end as shown is attached to the part B by a pin

*On a Steep Hill Your Brakes Will Keep You
From Slipping Back, But Your Carburetor Has Got to Help Shove You Forward*



STROMBERG

CARBURETOR

"The Accepted Standard"

Stromberg Motor Devices Company

54 E. 25th Street, Chicago, Ill.

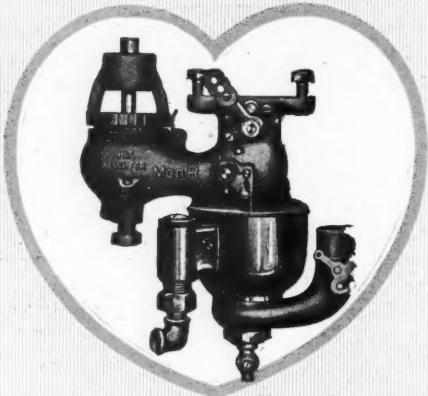
Branches: NEW YORK, BOSTON, DETROIT, INDIANAPOLIS, MINNEAPOLIS

Pacific Coast Distributors: Chanslor & Lyon Company, Los Angeles, Portland, Fresno, Spokane, San Francisco, Seattle
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SCHEBLER

Model R

1914



CARBURETOR

*Correct in Principle
Simple of Adjustment
Automatic in Action*

*Sure Starting
Greater Power & Speed
Better Economy*

Wheeler & Schebler, Indianapolis Ind.
"Pioneers in Perfection of Carburetion"

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Ferris-Dunlap Auto Supply Co..Dallas, Tex.	Fred Campbell.....St. Louis, Mo.
Interstate Electric Co.....New Orleans, La.	W. J. Connell.....Boston, Mass.
Reinhard Bros. Co.....Minneapolis, Minn.	Equipment Co.....Kansas City, Mo.
Manufacturers' Supply Co Philadelphia, Pa.	Elyea-Austell Co.....Atlanta, Ga.
Weinstock-Nichols Co....Los Angeles, Cal.	J. C. Nichols.....New York City
Pennsylvania Rubber & Sup. Co..Cleveland	Weinstock-Nichols.....San Francisco

Fairbanks, Morse & Co., Ltd., London, England
 Canadian Fairbanks-Morse Co. (All principal Canadian Cities)

The difference between an
"ELECTRIC HORN"
and a
KLAXON

for the guidance of car-buyers

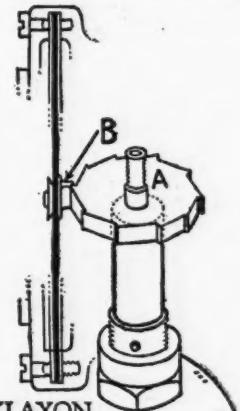
THE KLAXON is not an "electric horn." It is distinctly different both in principle of operation and in the character of its note.

The Klaxon is a noise machine. Its diaphragm is vibrated by a toothed wheel. This wheel is rotated by an electric motor; or, in the case of the Hand Klaxon, by a train of gears attaining high speed under pressure on the push-rod.

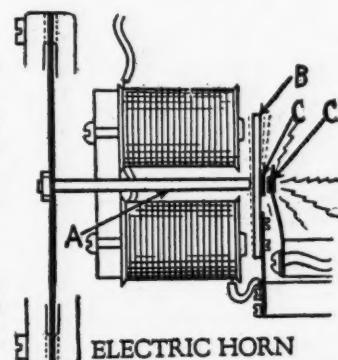
The diaphragm of the "electric horn" is vibrated by a "buzzer"—the same as that used for door bells and in pantries and offices. Each double vibration means a spark between two points. Unless these points are made of platinum iridium, the cost of which is prohibitive, they quickly wear off and the buzzer is useless.

In the Klaxon, on the other hand, each double vibration means that one tooth of the glass-hard steel wheel slips past the glass-hard steel button on the diaphragm. The wear is too small to measure. The stability of the mechanism makes possible the Klaxon guarantee of permanently satisfactory service.

The Klaxon note is loud. It is sharp and clean-cut—totally unlike the nasal buzz of the "electric horn." One Klaxon "tiger" (a short abrupt note made by lightly touching the Klaxon push button) is more effective than a dozen "buzzes," yet it makes less actual noise. Klaxon noise is concentrated—not drawn out.



KLAXON
The glass-hard toothed wheel (A) strikes the glass-hard button (B) on the diaphragm.



ELECTRIC HORN
The vibrating-armature (B) strikes the adjustable rod (A) which is attached to diaphragm, and breaks contact at points (C-C). Unless these points are made of platinum iridium, they soon wear down and the mechanism becomes inoperative.



KLAXONET

Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"



KLAXON



*Makes Every Gasoline
Motor Worth More*

Polarine
FRICTION REDUCING MOTOR OIL

Polarine starts to lubricate at the **first turn** of the motor—even in winter, after standing for hours at a temperature of zero. It **maintains the correct lubricating body** at any motor speed or heat, on the hottest summer day.

It penetrates to every part and gives it full protection. It keeps friction at the no-wear point and thus obviates many costly repairs.

And it serves in any type of motor—motor cars, motor boats, motor trucks.

Don't spoil a good motor with poor oil. And don't judge motor oil by appearance. The **poorest** oils may look as good as the best.

Polarine is made by the **World's Oil Specialists** after fifty years' experience with every kind of friction problem. Present day possibilities do not permit of the making of any better oil. All our vast facilities and resources are concentrated on Polarine.

Standard Oil Company
(AN INDIANA CORPORATION)

Makers of Special Lubricating Oils for Leading Engineering and Industrial Works of the World

(110)



The Hard Knocks of Time

Old Father Time hands out stunning blows. Some things are sturdy enough to stand his upper-cuts but the majority are counted out and sink into the depths of oblivion.

The **GLBAS** Storage Battery

has received its full share of time's knocks and has always come up smiling, the better and sturdier for its buffeting.

In the race for the survival of the fittest among storage batteries the **GLBAS** has been returned as winner, which is amply proven by the fact that it is used as standard equipment by the great majority of automobile manufacturers.

WILLARD STORAGE BATTERY CO., Cleveland, Ohio

New York Branch: 136 W. 52nd St.

Detroit Branch: 1191 Woodward Ave.

Indianapolis Branch: 438 and 439 Indiana Pythian Bldg.

Chicago Branch: 2241 Michigan Ave.

San Francisco Branch: 243 Monadnock Bldg.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO.

(78)

Here's a "Four" with more POWER than a "Six"

\$2400

*Nothing Extra
To Pay*

MOLINE-KNIGHT

\$2400

*Completely
Equipped*

More Power—More Flexibility—More Economy—More Silence

No other dealer can compete with
you on this Greatest Knight Motor

Power without noise—speed without jolt

Knight Engine The twenty-five foremost cars in Europe today are Knight motored. No matter what type of the old style poppet valve engine you are selling, your competitors have a poppet valved engine built on the same principle—so you are compelled to put up a pretty stiff argument why the prospect should buy a car from you instead of from the man across the street.

Smashes competition With the greatest Knight Motor on your salesroom floor—the Moline-Knight—you can forget competition and spend your time making *sales*—you will have something *new* to talk about—something different—indisputable arguments—that will bring you profitable *sales*. Your profits will not be spent in service afterwards.

Sells without argument Motorists who have demanded Sixes with more power and flexibility will buy the Moline-Knight. And those who have wanted Fours with low cost of upkeep will buy the Moline-Knight, too.

At least investigate this big, roomy, five-passenger, four cylinder, 128-inch wheel base, guaranteed 50 B. H. P. electrically equipped Moline-Knight—the car that anticipates the requirements of your trade.

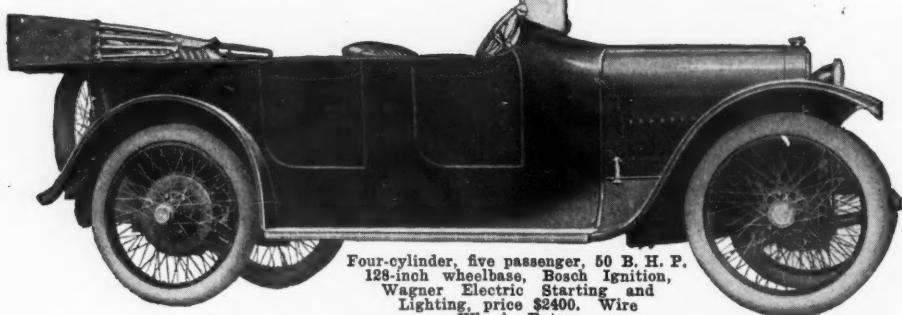
Write quick Write at once for our Advance Information Folder—it contains description, specifications and illustrations. In requesting Advance Folder you promise nothing, obligate yourself in no way—so write today.

See the Moline-Knight at the big Auto Shows

—get in communication with us before our output is allotted.

Moline Automobile Company

400 Willow St., East Moline, Ill.



Four-cylinder, five passenger, 50 B. H. P.
128-inch wheelbase, Bosch Ignition,
Wagner Electric Starting and
Lighting, price \$2400. Wire
Wheels Extra.

The "Four" that makes the "Six" unnecessary





If you will take the trouble to look up "springs" in the various encyclopedias and other authorities, you will find that springs are regarded as ill suited for use in all forms of measuring devices, except those, such as the thermograph, where the variable nature of the spring is used to measure temperature.

This proves that springs are affected by the slightest changes in temperature, and, consequently, cannot be expected to be constantly accurate.

For this reason, they have been eliminated from measuring devices as rapidly as an exact method of control could be found.

The Holley carburetor has no springs in its construction.

It depends for its operation upon natural forces of gravity and air pressure.

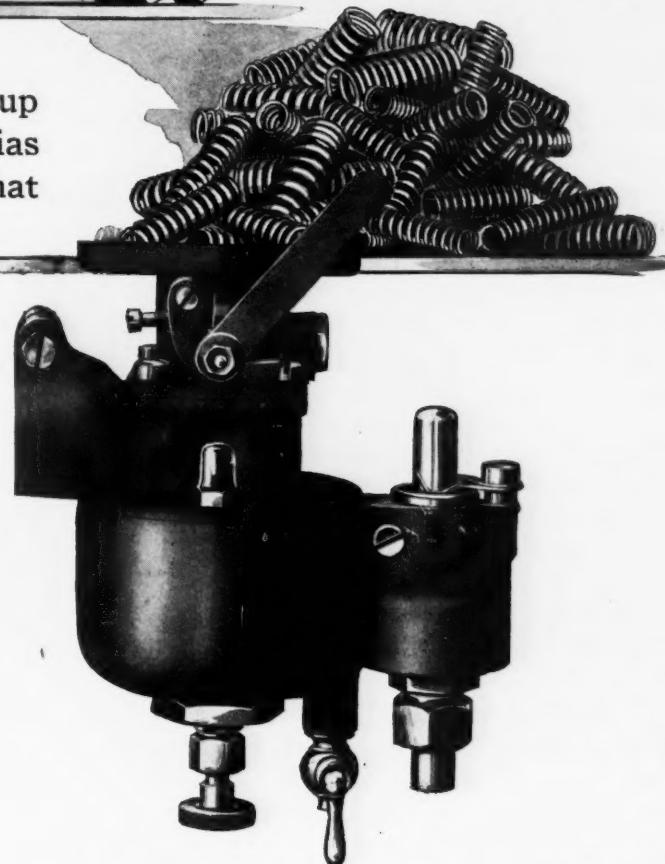
That is the reason why it is so accurate and reliable—why it has only one adjustment and no-moving-parts.

It is as much superior to the ordinary carburetor as the wireless is to the old system of telegraphy. Why don't you make your car up-to-date?

If there is no dealer near you, write direct to

HOLLEY BROTHERS COMPANY DETROIT MICHIGAN

When Writing to Advertisers, Please Mention Motor Age.



REO ACCESSORIES CO. 1220 Michigan Ave., Chicago, Ill.
OMAHA RUBBER CO. Omaha, Neb.

Foreign Branch: HOLLEY BROS. CO. Coventry, England
Holley Carburetors are carried in stock at the following addresses:
CHAS. E. MILLER, Home Office: 97-103 Reade St. and 121 Chambers St., New York.

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Vital Facts that the

YOU won't be able to find out all you ought to know about a car from looking it over at the show, for there are certain factors of the most vital importance to every prospective car purchaser that will not be a part of the exhibits.

We mean the capitalization—the indebtedness—the plan of organization and the financial policy of the company building the car.

Yet the dealer and the buyer should inquire into these things. They are of utmost importance to every buyer who is attempting to select the greatest value for his money. In the last analysis these factors almost alone determine the comparative value of the various makes of cars.

You will see Paige motor cars exhibited. You will see that they are better designed, better equipped, better built cars than are sold at anywhere near Paige prices. You will see such features in Paige cars as the multiple disc cork insert clutch, silent chain drive for motor shafts and a score of other equally high-grade features. You will see a complete electric lighting and starting system on the Paige "25" selling at \$975—the first car with this equipment at less than a thousand dollars.

PAIGE

And you will realize that Paige cars offer an extra value for the money.

But to know why the Paige Company is able to produce so much better car for the money than competing manufacturers you must know the Paige organization.

Inquire into the capitalization of the Paige Company and you will find that the total capital stock amounts to just \$250,000. This is all the stock that must earn dividends.

But suppose that, instead of this moderate capitalization, it were twenty or thirty millions. We would have to earn dividends on all of it and we would have either to take these dividends out of the car or add them to the price. Isn't that plain?

This capital is all GENUINE capital. The Paige Company does not believe in including a single dollar for patents, good will and valuable trade names, let alone five to twenty-five million as some prominent manufacturers are doing. And the stock is all common—no

PAIGE-DETROIT MOTOR CAR COMPANY

Paige 36 Specifications

116-inch wheel base; left side drive and center control; powerful 4x5-inch Paige motor, unit power plant; silent chain drive for cam shaft, pump and generator; perfect and smokeless lubrication; gasoline supply carried under shroud dash, with short, straight feed from tank to carburetor; multiple disc cork insert

clutch; aluminum castings for strength and light weight; extra deep radiator; crowned fenders; deep tilted 10-inch cushions.

Gray & Davis large unit electric starting and lighting system; ventilating windshield built into body; silk mohair top,

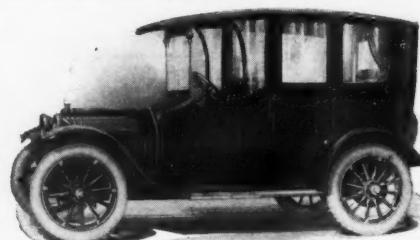
tan lined; Jiffy curtains; Stewart revolving dial speedometer; 12-inch electric head lights; 5 demountable rims; Good-year, Goodrich or Diamond tires, with non-skid in rear; Bosch magneto; and all incidental equipment.



PAIGE 36 GLENWOOD
\$1275



PAIGE 36 WESTBROOK
\$1275



PAIGE 36 NEWPORT
\$2250

Shows won't Show

preferred, with guaranteed dividends which must be paid whether advisable or not.

Then the attitude of the Paige stockholders helps wonderfully in putting extra value into Paige cars. They are big, substantial business men who do not regard the automobile business as a GAME at which they expect to clean up a fortune within a few years' time. They are satisfied with moderate earnings on their investment and insist that every dollar above these moderate earnings shall be put back into the car every season. And it IS put back, giving more and more value to Paige purchasers.

Then again, the Paige Company carries not a dollar's worth of bonded indebtedness. Remember this point and check it up when comparing car values. Put into figures, this point alone gives the Paige Company a five to seven percent advantage over competing makers.

The economical manufacturing conditions existing at the Paige plants mean MORE extra value.

The Paige selling system through DEALERS ONLY is another factor. There are no extravagant branches to be maintained at the expense of Paige buyers.

PAIGE

The large output (13,500 cars this coming year) and the financial strength of the Paige Company command the lowest prices and finest work from parts manufacturers.

All these factors play a part toward building up Paige EXTRA VALUE.

When you know these things you will understand why the Paige Company has gone along, year after year, building better cars—cars that "wiseacres" in the trade have, time after time, predicted could not be

continued at the prices asked.

With these facts in mind you will take more than ordinary interest in the Paige exhibits at the coming shows.

Or, if you are not able to attend the shows you will certainly want to see the Paige models at your dealer's.

You will find the famous Paige "36" touring car and roadster selling at \$1275. Also three closed body types ranging from \$1850 to \$2250. And the Paige "25" touring car and roadster at \$975.

For further information, wire or write,

304 Twenty-First Street, DETROIT, MICH.

Paige 25 Specifications

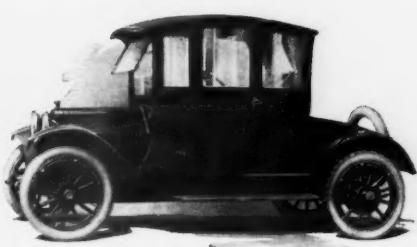
110-inch wheel base; semi-streamline body design; roomy tonneau; wide seats and wide doors; deep Turkish cushions; quiet Paige motor; electric starting and lighting system includes generator, start-

ing motor, storage battery and full lamp equipment; 32x3½-inch tires, Goodyear, Goodrich or Diamond, with non-skid in rear; rain-vision and ventilating windshield; silk mohair top and top-boot;

quickly adjustable inside curtains; 5 demountable rims; Bosch magneto; speedometer; linoleum-covered, aluminum-bound floor and running boards; foot-rail and robe-rail; dimmers in headlights; horn, jack, tools, pump, tire repair outfit, etc., complete.



PAIGE 36 MAPLEHURST
\$1950

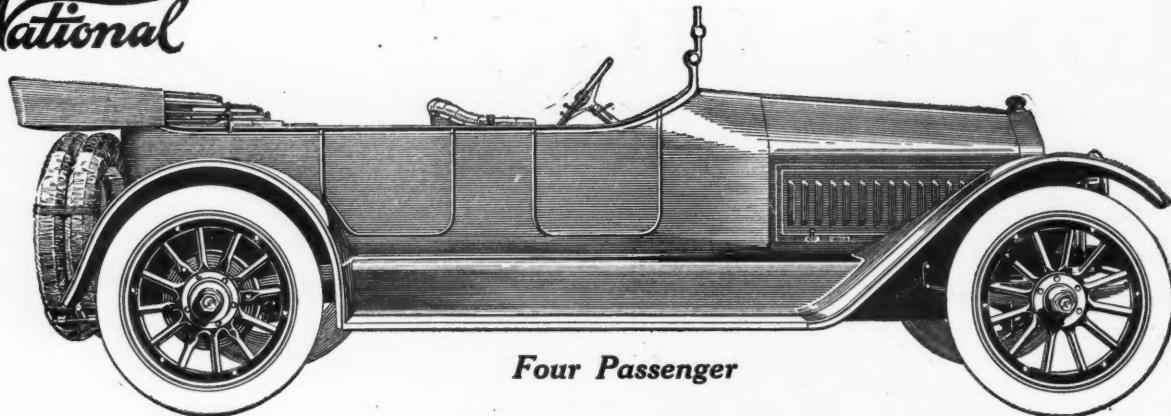


PAIGE 36 MONTROSE
\$1850



PAIGE 25 BRUNSWICK
\$975

National



Four Passenger

National—

**To see this new car is to desire it—
Ride once, and you determine to own it**

WE have added to our famous line of National 40 cars, this new beautiful Six. No other manufacturer offers a better range of cars in quality, appearance or service.

THIS new Six is a positive winner. If it were not so we would not build it nor guarantee it. When the National builders put their confidence in a car and give their guarantee for it, you can not find a better proposition even if you use a microscope.

You Don't Have to Raise the Hood

NATIONAL owners have learned that we build whole cars—the name *National* is their guarantee. Every *National* car is built as a unit—every mechanical part operates harmoniously to produce satisfactory results. You leave the responsibility for its mechanical construction to our experience—forget that there are gears and mechanical parts in the car. Just rest in comfort and enjoy your ride with absolute confidence in your car.

You Can Buy Over Telephone

NATIONAL owners buy performance and not specifications—they can buy their new *Nationals* over the telephone. We sell our experience, ability, responsibility and our guarantee—not a mere

job of assembled wheels, axles, gears and parts. That's why you don't have to raise the hood to buy a *National*, you know no better is made.

Lavish in Comfort

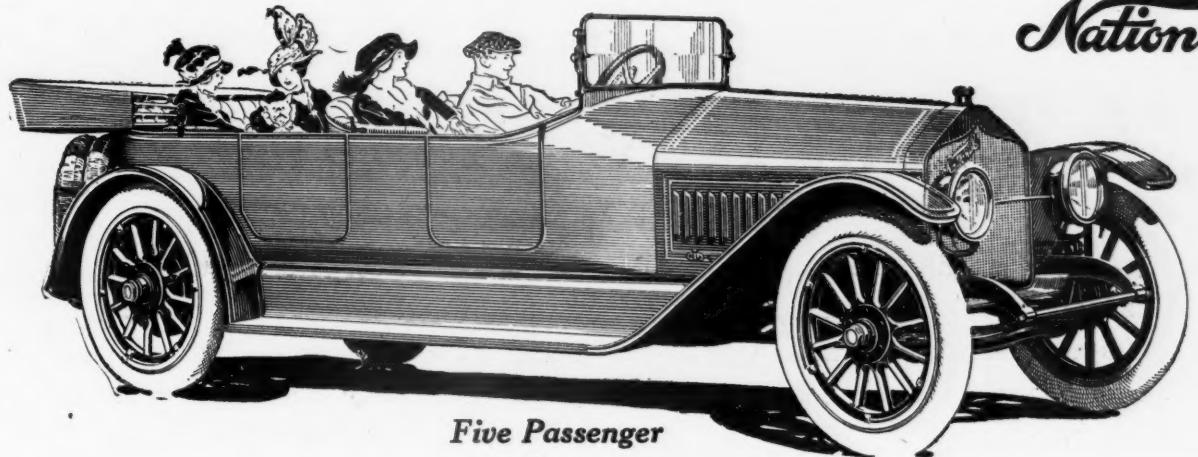
THIS new *National* embodies all our internationally recognized principles of superiority. Beautiful, economical, efficient and lavish in comfort—this car is the climax of the *National*'s success in car building since its pioneer beginning. It marks a most coveted improvement in motor car designing. It is the one car that harmonizes from end to end—a symmetrical creation that is distinctive and essentially practical.

First to Improve European Styles

OTHER makers have imitated the styles originated in Europe—but the *National* improves these advanced foreign designs. Nothing obstructs or spoils the continuous beauty of the long body lines. Both sides gradually converge toward the narrowed radiator, giving the whole car an original appearance and a “pointed” style. Smart slope from cowl to radiator.

EVERY dealer and every motorist in the country has been waiting for the right Six—and here it is. They've wanted a Six selling at the right price

**Most Comfortable
Car
You Ever Rode In**



“SIX” \$2375

Let the successful, reliable builders of the World's Champion cars make your car

—they've wanted a Six built by a manufacturer with years of experience—and a reputation for building a reliable product of the highest quality. That's just what this new *National Six* is—the right Six at the right price—backed by the quality, faith, integrity and honesty of product that have made the *National* car world-famous. The *National* Company were the first builders of successful 6-cylinder cars, making their first in 1905. Every one still in service.

National 40

THE *National* 40, with its marvelous history, needs no introduction. This is our staple car—the highest achievement in automobile building. Here is the best all-around motor car ever made. This is the third year for this successful car, in all of its essential features. This new series which embodies all improvements and refinements, includes:

Semi-Racing Roadster	\$2750
Speedway Roadster	3150
Four-Passenger Toy Tonneau.....	3300
Five-Passenger Touring Car.....	\$3300
Seven-Passenger Touring Car.....	3400
Three-Passenger Coupe	3500
Seven-Passenger Limousine	4800

Remember

WHEN you say “*National*” you are talking about the world's champion car. The *National* is the World's Stock Champion; International Champion 500-mile race record holder; Fastest Mile for stock car record holder, etc. No other has ever equalled the *National* in actual performance and demonstration of its quality, power, speed, reliability and sureness.

The Dealer

THE *National* car dealer is a happy man. His business is secure. He has faith in the manufacturers of the *National* cars who have fourteen years success, an unimpeachable

reputation for fairness and stability, and who have always been leaders. The *National* dealer knows his customers are satisfied. The *National* dealer can be liberal with service because the *National* factory gives him cheerful, instant service at all times.

Brief Specifications—*National Six*

Motor, six-cylinder, $3\frac{3}{4} \times 5\frac{1}{2}$ inch, cast en bloc. Tire pump, integral part of motor. Clutch, self-contained aluminum cone. Starting and lighting, electric two unit system. Transmission, sliding gear selective type, three speeds forward, one reverse. Gauge 56 inches. Oiling, crank case constant level, force feed, with gear driven pump. Ignition, high tension, dual magneto with storage battery. Tires $36 \times 4\frac{1}{2}$. Firestone demountable rims. Air pressure gasoline feed, generated by small pump in crank case. Capacity 23 gallons. Automatic carburetor. Two sets of brakes on 16 inch rear wheel drums. Bevel gear drive through straight line shaft with universal joints and torsion member. Full floating rear axle. Left side drive. Access all four wide doors. Single lever in center controls all speeds. Half elliptic springs, front, special *National* construction, rear.

Equipment:—Top complete with side curtains and boot, ventilating rain vision wind shield, extra Firestone rim, electric lighting and starting systems, 12-inch double bulb electric headlights, electric license tail light, Warner speedometer, electric horn, tools and jack.

Send This Coupon Today

Gentlemen:—Without obligation on my part send me complete particulars of *National* cars.

Name

Address

National Motor Vehicle Co., Indianapolis, Ind., U.S.A.

A Front Row Advantage

¶ Only a small percentage of the car and truck enthusiasts in the United States and Canada will attend the New York and Chicago automobile shows.

¶ A large percentage will read the complete reports of the shows in The Automobile and Motor Age, and they will derive more real educational advantage thereby than had they attended the shows.

¶ More than 40,000 motorists and dealers will depend upon these publications to learn what new and interesting things in connection with products of the industry were featured by the manufacturers at the Grand Central Palace and the Coliseum.

¶ Each copy sent to a subscriber is sure to be read by an average of four additional enthusiasts, thereby assuring actual reader circulation of 200,000. This circulation is "class plus."

¶ The "Big Five" January numbers will present the entire shows IN

DETAIL. A corps of highly efficient editorial experts will deliver, through the columns of The Automobile and Motor Age, a valuable service for the benefit of owners and dealers who have learned to depend upon these two great publications, and who justly recognize in them the highest authority.

¶ To occupy representative advertising space in our "Big Five" January numbers will be like displaying your products in the front window. Such display, Mr. Manufacturer, is of real value, and yields direct and profitable merchandising advantage.

¶ To those in the industry who have not already made space reservation we suggest quick action.

¶ And don't forget the big International Editions (English, French and Spanish) January 15th. If your goal is a world market here is the great chance.

¶ Write today for detailed information.

The Class Journal Company

New York

Chicago

Magnetic vs. Centrifugal

Speedometer Service

Stewart-Warner Service

Car Owner (entering a Stewart-Warner Service Station located in all large towns and cities): I have just taken my car out of storage, and I would like to have my season odometer set back to zero. I would also like a large gear changed as I have put on oversized tires.

Manager of Service Station: Won't take but a few minutes. (Delegates trained mechanic to set back odometer and another to install the new gear.)

Job completed in a very few minutes. Car Owner leaves, remarking, "That's real service." He's pleased with his car, and gives the manufacturer credit for having selected accessories backed by such real service.

speedometer shaft. Was able to get the other work done in the first garage, and expected to pick up a speedometer shaft in the next big town, but no one carried them. It was the same story in every town I visited. They all offered to sell me material for a "Magnetic Speedometer," but I told them mine was Centrifugal. I also found a lot of service stations that could do any class of work on Magnetic Speedometers, but they carried no parts for Centrifugal instruments. Much to my disgust, I completed the trip without the use of my speedometer. Now, what will I do about this shaft, and where will I get a new sprocket?"

Car Dealer: "I guess you will have to write to the manufacturers of your Centrifugal Speedometer and send them your old shaft. It will probably take another week or more before you get it on your car. I am sorry that in the meantime you will be without any speedometer or mileage record."

Car Owner: "Why don't your factory use a Stewart-Warner Magnetic Speedometer? I could have gotten service in any city I went through. They seem to be the only people doing a big enough business to run real service stations. I have also been reading a lot of car advertisements lately and I note that nearly every car is equipped with a Magnetic Type instrument."

Car Dealer: "Well, when I heard that my factory was going to use the Centrifugal Speedometer I begged them to equip with a Magnetic Type speedometer — we would then not have to 'explain.' I guess the real truth is that they were able to save money in buying the Centrifugal Speedometer. They have promised, however, that next year they will use the Magnetic Type Speedometer and other first class accessories throughout, which will be the equal of our car. If they don't, I am going to get the agency for some other car, for I am not going to lose you and other good customers."

NOW—WHICH SERVICE DO YOU WANT?

Stewart-Warner Speedometer Corporation, Factories: Chicago, Illinois. Beloit, Wisc.
Sole manufacturers of the magnetic speedometer

17 branches and nearly 100 service stations in all principal cities



Overland

\$950

Completely Equipped

With electric starter and generator—\$1075
Prices f. o. b. Toledo

Electric head, side,
tail and dash lights
Storage battery
35 Horsepower motor
114-inch wheelbase
33 x 4 Q. D. tires

Three-quarter floating nickel and aluminum
rear axle
Timken and Hyatt
bearings
Deep upholstery
Brewster green body

Cowl dash
Stewart speedometer
Electric horn
Flush U doors with
concealed hinges

JOHN N. WILLYS has clung
steadfastly to the watchword:
"The most car for the least money."
Each year he has made good this principle.

But never more so than the wonderful
1914 Overland at \$950—a car that costs
you 30% less than any other similar model.

Literature on request. Please address Dept. 46

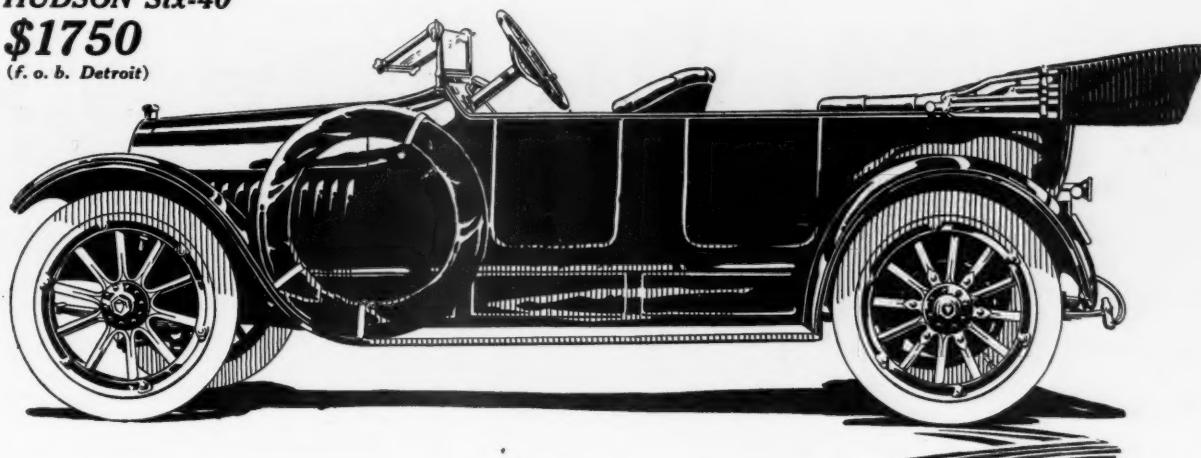
The Willys-Overland Co.,
Toledo, Ohio

*Manufacturers of the famous Garford and Willys-
Utility Trucks. Full information on request.*

HUDSON Six-40

\$1750

(f. o. b. Detroit)



How Long Will Men Pay This Price for a Four?

You men who sell cars have something new to consider.

The trend for years has been toward Sixes. Fourteen leading makers now build Sixes exclusively, and 37 of them build Sixes for best.

Four-cylinder cars have long been practically unsalable at a price which would buy a good Six.

This season comes the HUDSON Six-40 to sell at \$1,750—a price much below any comparable Four. It weighs much less than Fours of equal capacity. It costs much less to operate.

It weighs 400 pounds less than last year's HUDSON "37." It consumes one-fourth less fuel.

THE HANDSOMEST CAR

The handsomest car on the market this season is the new HUDSON Six-54. And this Six-40 is that same car made smaller. Wheelbase, 123 inches.

It has the same true streamline body, the same perfect equipment. There are two disappearing tonneau seats. The gasoline tank is in the dash. The extra tires are carried ahead of the front door.

The Six-40 has the "One-Man" Pantasote

top. It has quick-adjusting side curtains enveloped in the top.

It has dimming headlights, the Delco patented system of electric lighting and starting. No car at any price, up to six months ago, offered so many attractions.

And the car is a HUDSON, designed by Howard E. Coffin, who last year brought out the HUDSON Six-54, the most popular Six of the year.

THIS MARKS A NEW ERA

This HUDSON Six-40 enters a field where tens of thousands of Fours have been sold every year. It undersells those Fours, underweights them, and shows less operative cost. It outclasses any Four in equipment and appearance.

Beyond any question, it comes to capture that field, as Sixes have captured the whole field above that.

This is the most attractive offer that the HUDSON factory ever put out. It offers to dealers a very rare opportunity.

This Six-40 will be, during the next few months, one of the best-advertised cars in the country. We shall use the National Weeklies, Farm Papers and Magazines in a very large way.

We seek dealers in unoccupied territories.

Hudson Motor Car Company

7755 Jefferson Ave., Detroit, Michigan, U. S. A.

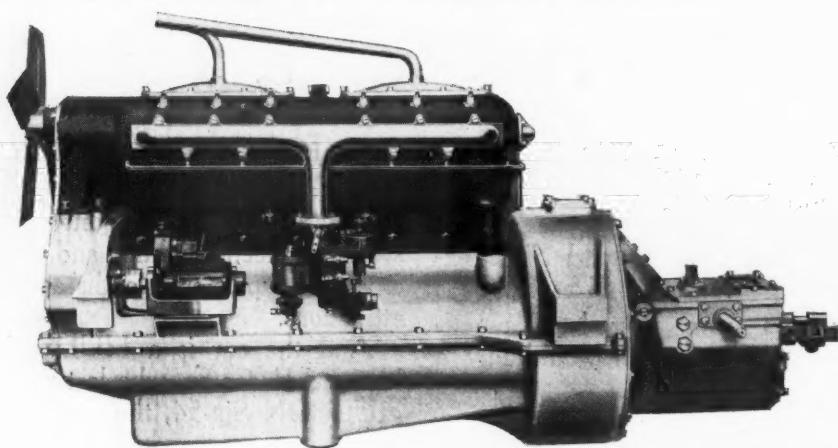
And now comes the most remarkable of all cars—the

Speedwell Rotary Six

On January 1st, 1914, the Speedwell Six equipped with six cylinder rotary valve motor makes its appearance. This wonderful motor, which has been perfected by seven years' test and development, is built in its entirety in the Speedwell shops. Every automobile owner, every dealer, every prospective car buyer will find our Speedwell Rotary Six literature intensely interesting. It concerns one of the few notable changes in automobile motor design in the past decade.

Two thirds
of this
Season's output
of
Rotary Sixes
already placed.
Don't delay.
Investigate
now.

Deliveries
of
Speedwell
Rotary
Sixes
Start
January 1st.



The principal points of advantage in the Speedwell Rotary Valve Motor are—

Simplicity and silence continued through the life of the motor, freedom from vibration, durability, no grinding of valves, perfect combustion chamber, greater freedom from carbon, fewer parts, unbalanced reciprocating motion eliminated, more even cooling, no premature ignition, no loss of power caused by leaky or incorrectly timed valves, and greater range of speed.



Brief specifications
of the Speedwell
Rotary Six

Speedwell Rotary Six Motor—bore 4 1/8", stroke 5 1/4", in unit with dry disc clutch and selective sliding transmission. 135 inch wheel base. 36x4 tires all around on five passenger, 37x5 on seven passenger. Wagner electric starting and lighting system. Dual ignition independent of starting and lighting. The standard equipment is complete and of uniform excellence.

Five passenger touring, \$2850

Seven passenger touring, \$2950

The Speedwell Motor Car Co., ^{Dept. M} Dayton, Ohio

The Speedwell Rotary Six will be exhibited at New York and Chicago Shows

Monarch

MOTOR CARS



Five Passenger Touring Car

\$1000 Complete (F.O.B. Detroit) with Electric Starter, Electric Generator and Wire Wheels

Note, the Equipment Includes:

Electric Self-Starter
Electric Generator
Electric Horn
Wire Wheels
Clear vision—rain vision windshield
Extension Top with famous "Jiffy" curtains
Three Electric Lamps
Dimmers in head lights
Jones Speedometer
Tools, repair kit, pump and jack
Tire Irons
Robe Rail
Footrail

Astonishing Car Value

Here is a car that sets a new pace for value at a thousand dollars. It has all the earmarks of a distinguished foreign car. It has the lines, the style and the beauty that challenge attention.

It backs this up with mechanical features that instantly disclose sound, conservative, practical engineering practice—ripe experience.

It has the strength, the speed and the lightness that mean satisfaction and economy. It has rare individuality; it stands out from the common herd in a manner that defies competition—makes selling easier.

It is the car that spells opportunity for the dealer. It gives you something to show, something to talk about. It stirs enthusiasm—and it keeps it up.

It is a full five-passenger car. Body is stream-line, of course. Note how perfectly it harmonizes with the Renault type hood.

Under that hood, by the way, is concealed a radiator. It can't be seen, yet it is easily filled from the outside.

We use a unit power plant, water cooled, cylinders cast in pairs. Three-bearing crankshaft, force-feed oiling system, multiple disc clutch, sliding gear transmission—three speed, center control, left steer, three-point suspension and a dozen other features that make a hit with the man that buys and the man that sells.

But, we are not going to talk specifications here. If you are "on" you will need no leading to this opportunity. You will beat the other fellows to it and wire at once for full details of our proposition—and while you're at it you will ask about territory before someone else snaps it up.

Don't wait—wire.

MONARCH MOTOR CAR COMPANY

Jefferson and Baldwin Aves.

DETROIT, MICH., U. S. A.

R. C. Hupp, President

When Writing to Advertisers, Please Mention Motor Age.

THE NATIONAL AutoShows



Under Auspices of Automobile Chamber
of Commerce, Inc.

At NEW YORK
Grand Central **PALACE**

January 3 to 10

**One Show
One Building**

Passenger Cars—Motorcycles—Accessories

At CHICAGO, January 24 to 31
Coliseum and 1st Regiment Armory

Both Shows Bigger and Better Than Ever

S. A. MILES, Manager

7 East 42nd Street, New York City

As sure as the Whirl of the World



A Capable Starting Motor

So rugged and powerful that it will spin a big six-cylinder automobile engine faster than 100 revolutions per minute with the ease of a Hercules and on less than 100 amperes of current, the Auto-Lite Starting motor can be relied upon to perform its function faithfully and fully—compelling positive starting day in and day out, winter or summer.

Strong—compact—*capable*—fully enclosed—protected from the deteriorating effect of water, dirt and grease, it is built for hard, continuous service and should last longer than the car to which it is attached.

Look for this efficient starter on your 1914 car.

The manufacturing and financial facilities of the Electric Auto-Lite Company are adequate to handle contracts of any size, not only for starters but for complete electric lighting and ignition systems as well.

An Explanation to Owners

While the complete Auto-Lite electric lighting system may be attached easily to the average car, it is more difficult to install a starting motor because space and structural limitations sometimes necessitate material alterations and considerable machine work before a satisfactory application can be made—hence orders from individual owners for starting motors are not solicited.

You can have the complete Auto-Lite equipment on your new car however.

Manufacturers can furnish it if you so specify.

The Electric Auto-Lite Company
"The Pioneer Makers of the 6-Volt Electric System"

Toledo,

Ohio



Every Motorist should have a copy of the Auto-Lite Handbook on Automobile Electric Systems.

Explains in detail, functions of the various parts—how to locate and remedy troubles of all kinds—embraces all electrical automobile systems. The large operation chart which it contains is alone worth the price.

Regular price 50c.

Will be sent to you for 10c in stamps if you use the coupon.

Branches

New York
Detroit

Kansas City
San Francisco

This Coupon Saves You 40 Cents

The Electric Auto-Lite Co.,
112 Michigan Street, Toledo, Ohio.
Enclosed find 10c in stamps for which please
send me your handbook.

NAME

ADDRESS

Why the Stewart Hub Odometer is Necessary on Your Electric Pleasure Car

AUTOMOBILES RETURNED															
A	M	P	Message Received	Wheels Returned	Whe lles Received	Car Returned	Returned By	Car Paid	Car Out	KEY In	WHERE TAKEN FROM	Odome ter Out	Odome ter In	Difference	REMARKS
✓	11	30	12:00	11:35	12:15	Stew	.05	✓	✓		21 Devonport St	1738	1766	28	

EVERY time a customer's electric car is returned to a certain large manufacturer's garage (name on request), a report like the above is made out. Notice that it gives the odometer reading when the electric was taken out and again when it was returned. The difference between the two readings shows the miles traveled while the car was in use.

Today's mileage and yesterday's mileage comprise the most important information given to the man who is to charge the battery of that car. This information shows him the condition of the battery.

If the man who charges your electric is given incorrect mileage he is misled, and his value as a battery expert is largely lost. Like a mariner with an unreliable compass, he works blindly—and you are the loser. He must know your correct mileage day by day, and he will know it if your electric is equipped with the Stewart Hub Odometer.

The Stewart Hub Odometer is absolutely positive. It is driven by worm and spiral gears that cannot fail. Its dials are controlled by our Geneva Stop principle that cannot fail. It is so made that it must record every mile and tenth of a mile you travel—and must record truthfully.

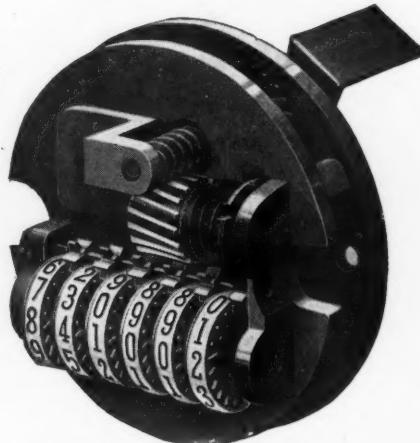
Beside accurately giving the battery charger absolutely necessary information, the Stewart Hub Odometer also tells you what you must know—how far you can go on a full charge—when you must turn back to the garage in order to escape running your battery out and being stalled.



A sturdy, sightly instrument that can be fitted to the hub of any truck or electric pleasure car. It registers to 100,000 miles in tenths, and repeats. The numerals are large, clear and easy to read. Their answer is always summed up. The mechanism is fully protected.

Insist on having a Stewart Hub Odometer on your new electric. Be sure to have one put on the electric you now drive. Its cost is but

\$15
Complete



An interior view of the Stewart Hub Odometer. Note its simplicity and strength. This shows the solid brass dials on their special shaft, the positive drive and the Geneva Stop Principle which moves and locks the dials with never-failing precision. The Stewart mechanism is error-proof.

The Stewart Speedometer Factory, 1931 Diversey Blvd. Chicago, Illinois

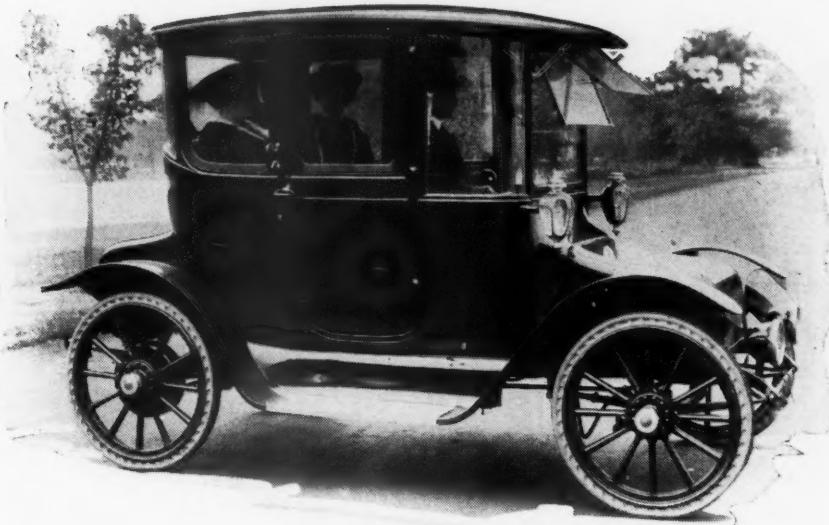
Stewart-Warner Speedometer Corporation

The world's largest manufacturers of speedometers for automobiles, electrics, trucks, motorcycles, motor boats, aeroplanes and cream separators

**1914
Detroit
Electric
Prices:**

With
Bevel Gear Axle
Victoria \$2300
4-pass. Brough-
a m. R e a r
Seat Drive.. 2550
5-pass. Brough-
a m. F r o n t
Seat Drive.. 2800

With
Worm Gear Axle
Gentlemen's
Roadster ... \$2500
4-pass. Brough-
a m. R e a r
Seat Drive.. 2850
5-pass. Brough-
a m. Detroit
Duplex Drive. 3000
(Prices
f. o. b. Detroit)



**1914
Features:**

Choice of worm or
bevel gear
Detroit Duplex Drive
Electric Hand Brake
Longer Wheelbase
12 ft. Shorter Turn-
ing Radius
Larger Tires
Larger Brakes
Increased Battery
Capacity (Washing
Unnecessary)
All battery cells ac-
cessible by raising
hoods
H a n l o n. Patented
Rain Vision Wind
Shield
More exclusive ap-
pointments
Deep Turkish Cush-
ions

10 Big Facts You Should Know About the Detroit Electric

Here are some of the things every dealer wants to know before contracting to handle an electric:

1. How strong financially is the builder of the car?
2. What is the reputation of the builder?
3. How long has the builder been in the business?
4. Is the car itself manufactured, or merely assembled?
5. What is the price?
6. What kind of factory is behind the car?
7. What class of materials is used?
8. What kind of service facilities has the builder?
9. How about the intrinsic mechanical merits of the car?
10. Is the car advanced in design, appearance, comfort and appointments?

The dealer has a right to demand answers on all these questions, because upon these answers depends his chance for selling cars, keeping customers satisfied, winning new ones.

We will be pleased to give you an answer on any one—or all—of these questions because our answers prove the superiority of the Detroit Electric. Write and ask us.

The Leader for 1914

Each year Detroit Electric sales have exceeded those of the year before. Each year the Detroit Electric has led all others, both in sales—which are double the sales of any other electric—and in new features.

From the very start our ideal has been to build quality cars, to keep ahead in improvements, to keep prices down. "Quality first" is the standard by which all our designers, artisans and mechanics are guided.

In beauty, comfort, silence, luxury and appointments, the 1914 Detroit Electric is the most advanced electric ever produced. It leads all other electrics in new features—choice of worm gear or bevel gear; choice of front seat drive, rear seat drive or Detroit Electric Duplex drive; batteries guaranteed; electrically operated brakes that spell absolute safety.

**THE
Detroit
ELECTRIC**

Write and Learn Our Unusual Opportunity to Dealers

Anderson Electric Car Company, Detroit, Mich.

BUILDERS OF "THE DETROIT ELECTRIC"

Largest manufacturers of electric pleasure vehicles in the world

Many automobile bearings have been ruined by adjusting them too tight or too loose. Improper or careless adjustment is liable to cause serious trouble—scored shafts or stripped gears.

Hyatt Roller Bearings have flexible spiral rollers that give just a little under load and are less subject to wear, consequently the necessity of adjustment is entirely eliminated. This feature makes them "fool proof."

Two books, one about motor car bearings in general for prospective purchasers, the other for automobile owners, will be sent on request

"*Hyatt Quiet Bearings*"



HYATT ROLLER BEARING Co.
DETROIT, CHICAGO
NEWARK, N.J.

Baker Electrics

New York Show, Jan. 3d-10th

Baker Electrics will be exhibited at the Grand Central Station, Electric Vehicle Section.



Chicago Show, Jan. 24th-31st

Baker Electrics will be exhibited in the First Regiment Armory, Electric Vehicle Section.

Announcement To The Dealer Who Wants The Facts About Electrics

BAKER ELECTRICS are the product of the *oldest, largest, best known and financially safest* exclusive manufacturers of Electrics in the world.

Representatives of every other well known Electric have acknowledged that they would rather take a second-hand Baker in trade than any other Electric on the market — you know that this universal admission grants the Baker the best *first-hand* value.

Independent garage men all over the country state that the Baker *requires less service attention and costs less to keep going* than any other Electric made.

The *superiority of Baker construction* is a matter of common concession.

No other Electric car manufacturer in business maintains anything to compare with the *Baker traveling organization* for constant assistance to dealers.

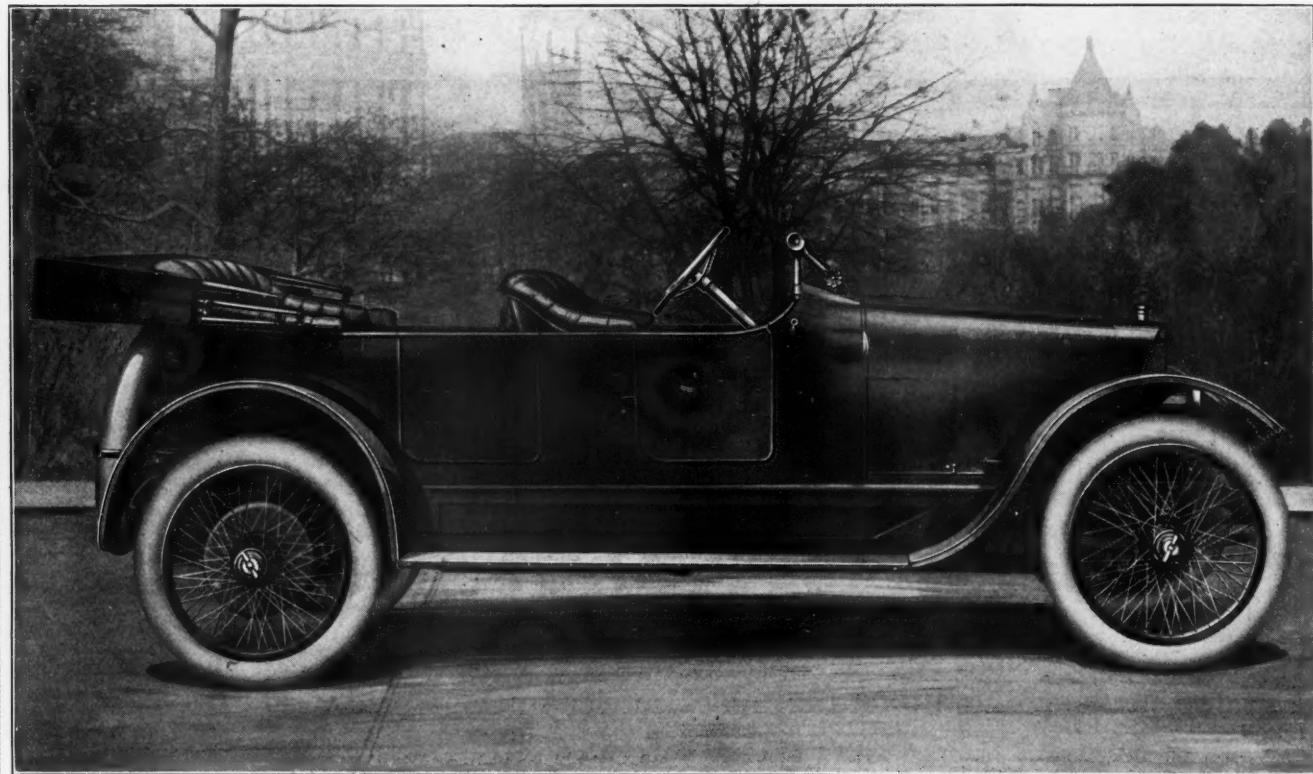
The sale of Baker Electrics has been developed and *kept* on a liberal profit making basis—yet Baker prices are no higher than those of any other well-known Electric. The Baker Company started its building for the future fifteen years ago.

The dealer makes a greater ultimate profit on a Baker Electric than on any other Electric made.

The new Baker Electric Coupe and the new Baker Double Drive Worm Gear Brougham combine unusual beauty of new body design and appointment with structural superiority undisputed anywhere. They will be the most easily salable Electrics on the market for the coming year.

Write for Descriptive Matter and Detailed Information

The Baker Motor Vehicle Co., Cleveland



Palmer-Singer

"Brighton-Six"—Model L

One Year Warranty

tires; quick demountable rims; shock preventers on rear springs; eight day flush type keyless clock; Warner-Stewart speedometer; all gauges, dash fittings, clock and speedometer are mounted flush with sub-dash; gasoline tank located at rear of frame; 20 gallons capacity; splash and pump lubrication; multiple jet carburetor; dual ignition; multiple disc clutch; selective transmission; extra large brakes; extra large wheel spokes, natural finish; deep upholstery; extra long springs; extremely quiet running—the cleanest looking car in the market—and "The Strongest Built Car in the World."

Our newest model for 1914, now ready for prompt delivery—the finest, the most beautiful "Brighton" we have yet produced. \$2495, including everything (except wire wheels, \$80 extra).

Six cylinders, 50 H. P. (develops 72 H. P.), electric starting (compressed air starting optional); electric lighting, bull's-eye sidelights built into cowl; 134-inch wheel base; 36x2 1/2-inch tires; clear-vision windshield; "one man" top and boot; patented storm curtains; gasoline tank located at rear of frame; 20 gallons capacity; splash and pump lubrication; multiple jet carburetor; dual ignition; multiple disc clutch; selective transmission; extra large brakes; extra large wheel spokes, natural finish; deep upholstery; extra long springs; extremely quiet running—the cleanest looking car in the market—and "The Strongest Built Car in the World."

We have only good words for other Sixes; but we cannot see why some of them cost so much.

We do know, however, why the Palmer-Singer 1914 Model L at \$2495, completely equipped, including everything, costs more than the lower priced Sixes. It is because each and every part or unit employed in its construction is the best of its type obtainable, while the makers of the cheaper Sixes must, perforce, economize in every way necessary to build within a fixed price.

But, in comparison with the group of Sixes of higher prices, our new Model L "Brighton" will be found to completely outpoint and outclass every other Six of similar motor, chassis and body dimensions in the market, regardless of price.

To Dealers:

Palmer-Singer dealers are successful because they sell a successful car.

The Palmer-Singer dealership is a valuable asset—if you can qualify for appointment for your district, your success is assured.

Write today.

Palmer & Singer Manufacturing Company,

Factory, Long Island City
NEW YORK CITY

DETACHABLE WIRE WHEELS

FOR ALL MAKES FROM
FORDS to PACKARDS

Are you the DEALER we want in your city?

Are you awake to the opportunity offered in SUPPLY-
ING the DEMAND for WIRE WHEELS?

Are you in a position financially to handle them?

All right, then; write us for detailed proposition—and
don't forget your references.

GEORGE W. HOUK CO.

1702 Elmwood Avenue,
Buffalo, N. Y.

NOTE Dealers located in New York City, Phil-
adelphia, Boston, Chicago and Detroit
—don't trouble to write—CLOSED



KEETON THE TWO CARS THAT WILL INCREASE YOUR SALES CAR-NATION

The volume of your sales largely depends upon the attraction value of the cars you handle. Some cars feature power, some economy, some quietness, others speed, appearance, price, etc., but in no other car will you find these qualities blended in such harmonious proportions as in the new "Six-48" Keeton.

A limited number of these "dis-

tinctive" cars will be produced for the coming season and dealers will find it greatly to their advantage to get in touch with us at once.

KEETON SPECIFICATIONS

Electric starting.
Full electric light equipment.
Six cylinders cast en bloc, large valves.
Small bore, long stroke.
All moving parts completely enclosed.
Exceptionally powerful and flexible.
Radiator at rear of motor in proper and protected position.
Centrifugal pump and flywheel fan insure ample cooling.

Four speeds forward in transmission.
Direct on 3rd—geared up on 4th.
Left-hand drive—right-hand control.
Wire wheels—with extra detachable wire wheel.
Long 136-inch wheelbase—long springs, special alloy spring steel, nearly flat under load.
Chrome vanadium gears and shafts on imported annular bearings.
Pressure gasoline feed.
Very roomy and comfortable bodies.
Best of foreign practice adapted to American road and touring conditions.
Very complete and detailed equipment.

Prices F. O. B. Detroit.
2 Pass. Roadster, completely equipped..... \$3250
7 Pass. Touring Car, completely equipped..... \$3250
A full line of open and closed bodies.
Interesting literature sent on request.



Two-passenger Car-Nation Plowing the Mud

CAR-NATION SPECIFICATIONS

Unit Power Plant—Motor—4 cyl. en bloc 3½ x 3½ "L" head—large valves and bearings. Very quiet and powerful.
Ignition—Magneto—Fixed spark.
Lubrication—Constant level splash—plunger pump.
Carburetor—Approved type—very economical.
Cooling—Thermo syphon. V-shaped radiator—adjustable belt-driven fan.
Clutch—Multiple steel disk type running in oil.
Transmission—Selective type 3 speeds forward and reverse—one lever control.
Drive—Bevel gear through concentric torque tube with one universal joint.
Rear Axle—Semi-floating type, Hyatt roller bearings.

Brakes—Emergency, internal exp. on 10" drum on rear wheels. Service external contracting on transmission shaft.

Wheels—Detachable wire—30x3" clincher rims and smooth tread tires.
Control—L. H. drive center control.
Tread—40".
Wheelbase—104".

Standard equipment—Horn, head lamps and tail lamps with set of tools.

PRICES

Model A—2 Pass. Roadster.....	\$495
Model B—2 Pass. Tandem Type.....	510
Model C—4 Pass. Touring Car.....	520

Extra Equipment: Top, \$25.00; Windshield, \$10.00

\$495 Car-Nation \$495

"The Car for the American Public"

More than a Cyclecar

The Car-Nation has all the features hitherto only found on large, expensive cars, yet it is light, snappy, economical (25-30 miles to the gallon) and the price is within the reach of the great majority of buyers.

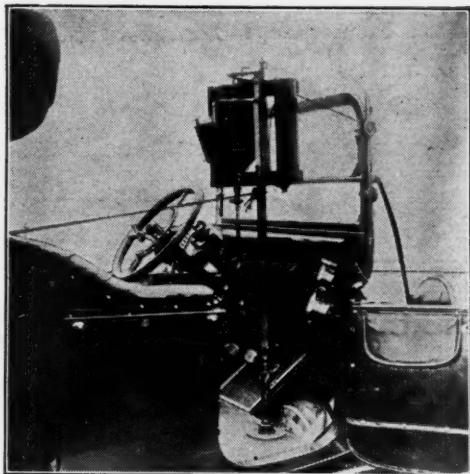
The Car-Nation is made of standard parts, every one of which has been time tried and proven by use in bigger cars costing \$1000 and over. Just think of what this means in *every day service* to an owner.

Read the specifications and go over them part by part with any car you can think of. The 4 cylinder block motor with 3 speed forward and reverse, selective type transmission and multiple disc clutch as a unit power plant; wire wheels; left hand drive; center control; V shaped radiator with a sloping hood and cowl—in fact, every part is a "feature" in many larger cars.

Dealers We are now producing these cars and the territory is going fast. You can make a very advantageous connection by closing your territory for this line.

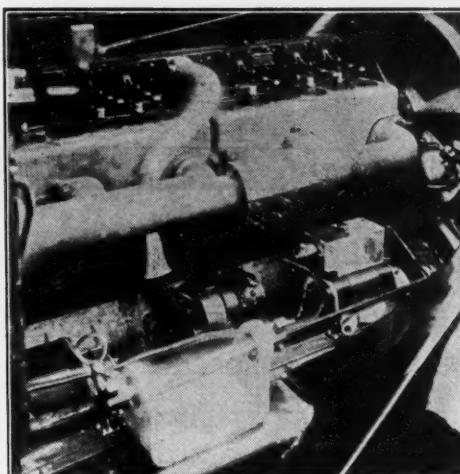
Write or wire now.

Manufactured by **KEETON MOTOR CO., Detroit, U. S. A.** See our Exhibits at NEW YORK and CHICAGO



Packard equipped with auxiliary gasoline tank and measuring instrument.

If it takes 5 per cent of the power of a big Packard engine to run the electric system—



Packard motor with dummy replacing generator used in no-generator test.

How About YOUR Car?

(From Automobile—Dec. 4, 1913)

"In a test conducted by the Packard Co., on Long Island Parkway on Saturday, it was found that the Bijur generator, on the new 38 model, consumed from 3 to 5 per cent of the power as represented by the gasoline supplied to the engine. These figures are of great interest at the present time in that much discussion is taking place as to the real efficiency of the electric system of lighting and starting automobiles."

This Is Added Proof

The results of this Packard test show that in ordinary conditions at average speed, at least 5% of the power is consumed by the electric system; 3.3% of the power was consumed by the electric system at a speed of 40 miles per hour.

How often do you drive at 40 miles per hour? If you have any respect for speed laws most of your driving is at less than 20 miles per hour.

In this test the car was loaded with passengers, the top, wind shield and side curtains up, carrying extra tires. The extra weight naturally decreased the percentage by increasing the *total* amount of gasoline used for carrying weight.

But at the speed of 20 miles per hour—even with the extra weight—the big 38.4 horse power Packard engine used a good 5% of its power to run the generator.

Electric lighting manufacturers claim that the electric generator uses only 1/2 of one per cent of the power.

Add the Packard test to our figures showing 5 to 12% of power consumed by electrical equipment. Here are the figures:

38.4 h. p. Packard	5%
32.4 h. p. Car Test	6.9%
25.6 h. p. Car Test	10 to 12%

The complete report of tests similar to the Packard test, together with tests of owners in actual service and other valuable information on lighting will be sent you promptly. Use the coupon.

One Point More

Even if it were possible that the engine of YOUR car was big enough, powerful enough so that you would never miss the 5 to 12% power used in running the electrical system—

Even if you did not care how much your lighting cost—

Consider one more point.

Safety

Here's what one paper says:

"Seventy-five per cent of the collisions that have taken place in the night time of San Francisco of late can be laid to the glare of the electric headlights of the modern car."—Pacific Motor, San Francisco.

The coupon brings added proof. Use it!

THE PREST-O-LITE CO., Inc.

233 Speedway, Indianapolis, Ind.

(Contributor to Lincoln Highway)

Exchange Agencies Everywhere

THE PREST-O-LITE CO., Inc.,
233 Speedway, Indianapolis, Ind.

Please send the Facts about All Lighting Systems to

ZENITH

CARBURETORS

- ¶ The carburetor without springs, valves or pistons.
- ¶ The carburetor that gives constant mixture at all speeds.
- ¶ The carburetor that is unaffected by altitude and needs no adjustment.
- ¶ The carburetor found upon probably more high grade cars the world over than any other—a supremacy naturally established by merit only.

The Zenith Carburetor Company
American Factory, Detroit, Michigan

ZENITH

CARBURETORS



*Superior Boulevard, Minneapolis
Built of Concrete*

**An Ideal Road
for Motoring**

A stretch of road like this is a "find" to the motorist. After jolting along over deeply rutted dirt roads or bumpy macadam ones, to let the engine out on a stretch of smooth, hard concrete is like riding on air.

You can have such roads as these. Use your influence as a taxpayer to secure the use of concrete on the roads in your vicinity. The initial cost is but little more than macadam, and the upkeep practically nothing at all.

Our books on concrete for road construction tell why concrete is economical, dustless, clean and permanent. The books will be sent you for the asking.

UNIVERSAL PORTLAND CEMENT CO.
CHICAGO · PITTSBURGH · MINNEAPOLIS
Plants at Chicago and Pittsburgh
Annual Output 12 000,000 Barrels

Thermoid

HYDRAULIC COMPRESSED

Brake Lining—100%

Every customer who comes into your place of business is reading about Thermoid Brake Lining—every day—every week—every month. He is learning what brake lining is—that, to be 100% efficient, it must be brake lining clear through, not just on the outside.

Watch the Saturday Evening Post and other big magazines for Thermoid advertising.

Send for Terms, etc., now

THERMOID RUBBER CO.
TRENTON, NEW JERSEY

Thermoid is brake lining all through. Its density is fixed. Can't be destroyed by heat generated in service—nor affected by oil, water, gasoline, dirt. Sell Thermoid.

Our Guarantee: Thermoid will make good—or we will.



The Atwater Kent Ford Ignition

does more than eliminate the frequent and troublesome adjustment of the Ford coils.

The Atwater Kent Ignition assures perfect synchronization at all speeds, eliminating preignition and overheating—starts easily with a quarter turn of the crank and frequently without cranking by means of the starting button on the coil.

Effects a saving in gas, wear and vibration by enabling the motor to run

slowly while the car is standing and run as smoothly "on high" at four miles an hour as at twenty or thirty.

The Atwater Kent will, in addition, wonderfully increase the power, speed, flexibility and hill-climbing ability of the Ford car, and gives superior results and costs less than half that of the high tension magneto.

It consists of the Unisparker or distributor elevated to a convenient and accessible position which takes the place of the Ford timer and a single non-vibrating coil is installed in place of the four vibrating coils.

It is easily installed by anyone who can time a motor—no holes to bore—a screw driver and wrench are the only tools required.

Price, complete with hand-operated switch, \$28.00. Foot-operated switch \$2.00 extra.

For sale by all good jobbers and dealers. Write at once for circular "A"



Atwater Kent Mfg. Works, 4934 Stenton Ave., Philadelphia, Pa.

THE GREATEST CAR VALUE FOR 1914

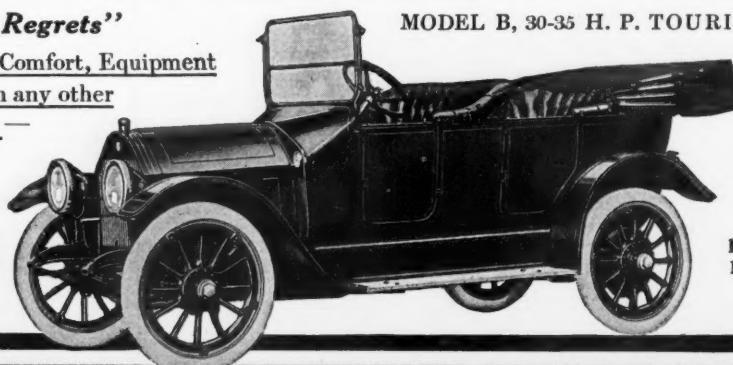
See all others—but examine the KING before you buy

"The Car of No Regrets"

MORE Service, Economy, Comfort, Equipment and Style than can be had in any other car near the KING'S price—

\$1095

WITH EQUIPMENT
Ward Leonard Starter and Generator, \$100 net additional.



MODEL B, 30-35 H. P. TOURING CAR AND ROADSTER

"None So Easy Riding"

The KING'S patent cantilever rear springs make all auxiliary shock-absorbers unnecessary; prevent "side swing" and assure long life to car and tires.

Write for catalog

KING MOTOR CAR CO., Detroit, Mich.

New York Agency, Broadway at 52d St.

AGENTS—Some choice territory still open. Wire today.

KING

To Keep a New Car Good Use EAGLEINE NO-CARBON OIL

You are doubtless proud of your car, proud of the powerful, silent, efficient motor which takes you over the highway at any speed, and brings you home again.

But your pride will lose its edge, and your motoring joys will be but a memory when that expensive motor becomes noisy, weakened, and inefficient, because of carbon clogged cylinders.

You can't expect clean cylinders if you lubricate them with impure oil.

Buy EAGLEINE NO-KARBON OIL. It is the purest, safest, and most satisfactory cylinder oil known to the automobile industry.

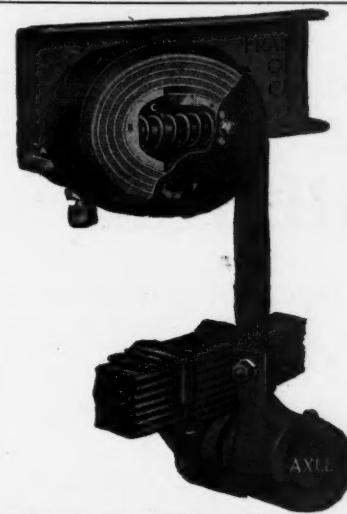
Eagle Oil & Supply Co.
104 Broad St.
BOSTON MASS.



Chicago Branch: 1114 W. 37th St., Chicago, Ill.

Roger W. Stadman
21 Hoover St.
Los Angeles, Cal.

Ask the Engineering Department of Your Car About



Easiest to apply. Merely clamp coil to frame and secure belting around axle. Nothing to work loose, rattle or wear out. No future readjustment required. Snubbers allow the springs to work naturally on the closing movement, but retard abrupt or excessive expansion; prevent the snappy rebound that jars mechanism and passengers; put a stop to excessive up and down movement of springs.

GABRIEL SNUBBERS

—they know, for they have fully tested them and know their merits.

Gabriel Snubbers are Standard Factory Equipment on White, Oldsmobile, Peerless, Stearns and Lozier; Partial or Special Equipment on over twenty other makes.

On Small Cars, Just as on Large Ones

Snubbers pay for themselves many times over in easy riding, reducing upkeep expense and adding to the length of service of your car.

Ask the Engineers!

GABRIEL HORN MFG. CO., 1415 East 40th St., Cleveland, Ohio

Makers of the Famous GABRIEL MUSICAL HORMS and WINDSHIELD CLEANERS

American Made for American Trade

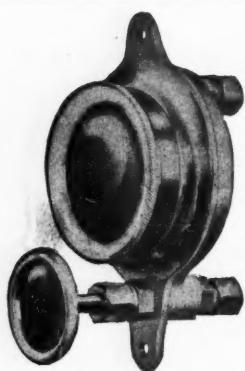
NEW DEPARTURE GUARANTEED BALL BEARINGS

To facilitate supplying demand for garages, dealers and owners, for New Departure ball bearings, the following distribution agencies are announced, where stock of these bearings is carried.

Ahlberg Bearing Co. 93 Mass Ave., Boston, Mass.
Pruyn & Bloddeau. 1550 River St., Hyde Park, Boston, Mass.
Ahlberg Bearing Co. 1790 Broadway, New York City
Jos. C. Gorey & Co. 352 W. 50th St., New York City
The Gwilliam Co. Broadway & 58th St., New York City
Pruyn & Bloddeau. 1876 B'way, cor. W. 62nd St., New York City
Albany Hdve. & Iron Co. Albany, N. Y.
Syracuse Rubber Co. 212 S. Clinton St., Syracuse, N. Y.
Iroquois Rubber Co. 279-283 Washington St., Buffalo, N. Y.
Rochester Rubber Co. 24 Exchange St., Rochester, N. Y.
The Gwilliam Co. 1314 Arch St., Philadelphia, Pa.
Bumiller-Remelin Co. 482 Main St., Cincinnati, O.
Craay Bros. 1111 West 11th St., Cleveland, O.
Hearsey-Willis Co. Indianapolis, Ind.
Machinists Supply Co. Pittsburgh, Pa.
Ahlberg Bearing Co. 2637 Michigan Ave., Chicago, Ill.
Chicago Pulley & Shafting Co. 32-36 S. Clinton St., Chicago, Ill.
Herring Motor Supply Co. 912-14 Locust St., Des Moines, Iowa.
Faeth Iron Co. 1125-31 West Eighth St., Kansas City, Mo.

Pence Automobile Co. 800 Hennepin Ave., Minneapolis, Minn.
Fred Campbell. 1109 Locust St., St. Louis, Mo.
Elyea-Austell Co. Atlanta, Ga.
The Lininger Implement Co. Sixth & Pacific Sts., Omaha, Neb.
Denver Auto Goods Co. 1600 Broadway, Denver, Colo.
Fry & McGill. 16th & Broadway, Denver, Colo.
M. L. Foss. 1729 California St., Denver, Colo.
Bertram Motor Supply Co. 251 S. State St., Salt Lake City, Utah
J. W. Leavitt & Co. 301 Golden Gate Ave., San Francisco, Cal.
Irvin Silverberg & Co. 541 Van Ness Ave., San Francisco, Cal.
Kimball-Upsom Co. 609-11 K St., 608-15 Oak Ave., Sacramento, Cal.
Western Rubber & Supply Co. 1011 S. Olive St., Los Angeles, Cal.
Western Rubber & Supply Co. 66 S. Fair Oaks Ave., Pasadena, Cal.
Western Rubber & Supply Co. 1364 Fifth St., San Diego, Cal.
Ballou & Wright. Seventh and Oak Sts., Portland, Ore.
Ballou & Wright. 817 E. Pike St., Seattle, Wash.
Child, Day & Churchill Co. 1215 First Ave., Spokane, Wash.
Automobile Supply Co. Tacoma, Wash.

New Departure Manufacturing Company, Bristol, Conn.



Start Your Car With One Turn of the Crank With The WEBB JAY Automatic SUCTION PRIMER

It Automatically Refills Itself

Our Primer refills itself automatically by suction. The primer is $2\frac{1}{2}$ inches in diameter, heavily nickel-plated and an ornament to any dash board. The sight-feed attracts the attention of every automobile owner and permits the motorist to know exactly how much gasoline is going to his cylinders.

This primer saves time, labor, money, and temper. It is inexpensive and everlasting, simple in operation, easy to install, and infallible if used according to directions. It greatly increases the efficiency and insures the perfect operation of all self-starters, whether electric, air or mechanical. Any chauffeur, mechanic, repair shop or factory can easily install it.

PRICE, COMPLETE WITH FITTINGS AND PIPING, \$6.00
Full directions for installation accompany each primer

At all dealers, or direct on receipt of price. Some territory still open to agents

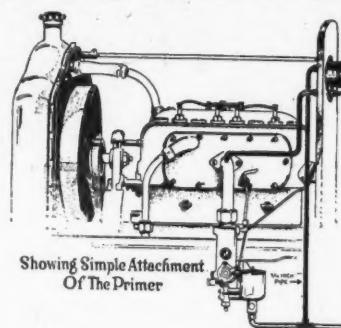
The Motor Devices Co., 2635 S. Wabash Ave., Chicago, Ill.

How to Operate the Primer

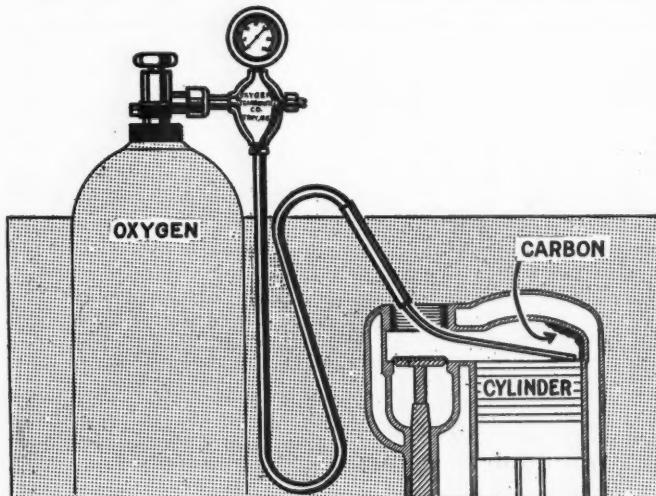
To get the best results from this primer follow these directions: "When stopping motor, open priming valve wide; then pull switch plug. Then close priming valve."

This results in a rich priming charge being drawn into the cylinders which remains there ready for the next start.

This device is protected by letters patent which broadly cover the basic principle of automatically priming by engine suction. **Infringers will be vigorously prosecuted.**



Showing Simple Attachment
Of The Primer



Perfect Carbon Remover \$10

Will remove all carbon from cylinders. Easily and in few minutes. Equal of any high-priced outfit. All parts guaranteed. Keeps up efficiency of cars and trucks. *Big money maker* for garages.

Price \$10

(Without Oxygen Tank)

Usual price \$15. As we sell for cash only and no accounts carried, customers are given \$5.00 off on every outfit. Express companies allow inspection—you take no chances.

Sent prepaid—cash with order or C. O. D.

OXYGEN DECARBONIZER CO. 301 River St.
TROY, N. Y.
SEND FOR INFORMATION



"CASEY" MAKES YOUR OLD TIRES WEAR TWICE AS LONG

Double Your Tire Service

The Kant Creep Inner Tire makes your old casing good as new. Gives you another 3000 to 5000 miles, and when the casing is finally worn out, the Inner Tire is good for unlimited service in your next casing.

Complete protection against blowouts and 90% puncture-proof, you forever solve your tire troubles with the

"K. C." Inner Tire

Unlike the old reliners, the "K. C." completely surrounds the inner tube, reinforcing the casing and thus giving

Complete Protection At Every Point

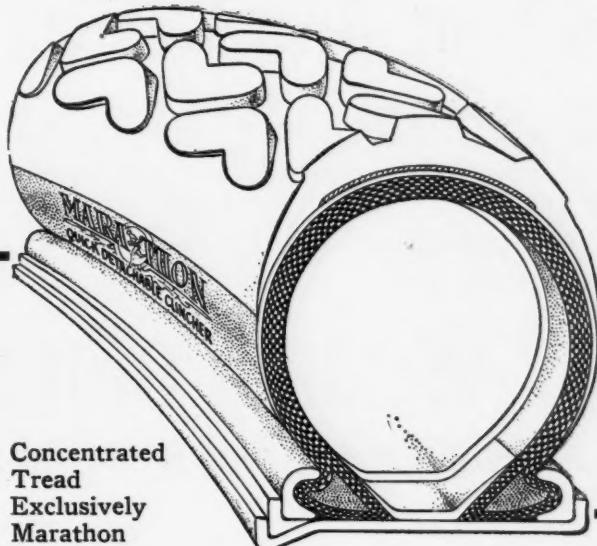
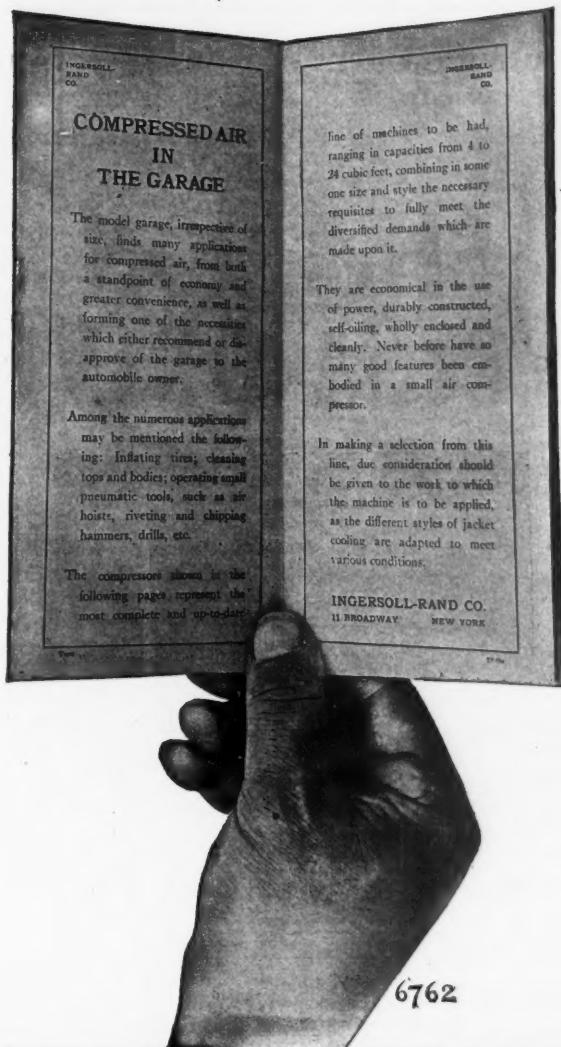
K. C. Inner Tires will hold on rim cuts, and are the only liners that will not pinch or creep. Write for booklet, "The Tire Question," and prices.

DEALERS: WRITE FOR INTERESTING TRADE NEWS AND NEW PRICE LIST.

Western Tire & Rubber Company

Factory Office, 17th and Woodland Streets
Kansas City, Missouri





Concentrated
Tread
Exclusively
Marathon

Exclusive Sale Marathon Tires

Think what it means to control the sale of the Marathon Tire in your city—this most extraordinary tire—a tire wholly in a class by itself.

Right now, Mr. Dealer, you are figuring how to make more money for 1914. Consider this: Which tire is most profitable to you—a make that every other dealer in your town sells, or the MARATHON 4,000 MILE TIRE that you can sell exclusively?

Why You Haven't Made Money in Tires

You have handled what every other dealer handles. Competition is keen. Your competitors want business and they begin to cut prices. To make a sale you must cut below their price. That's why you have not made money on tires.

Marathon Exclusive Sale Plan Eliminates Price Cutting

We will give the *exclusive sale* of Marathon tires and tubes to one good dealer in every town or city.

That eliminates price cutting. Protects you and insures you of a good profit; and it insures the tire user of better service.

Selling Marathon tires you have no reason to cut prices—no necessity. No one else in your territory can get the sale of Marathon tires. That's why you can make more money selling Marathons.

Quality Maintained

We shall absolutely maintain Marathon original quality. Our policy is to give the highest quality possible and

charge the lowest price consistent with that quality.

In the face of the new cut prices, can others maintain quality—and will they?

Factory-Insured 4,000 Miles

We actually *factory-insure* the Marathon tire. We absolutely build quality—long mileage—service into Marathon, by slow, careful hand building, using finest materials obtainable. You see why we can guarantee this tire for 4,000 miles.

The Concentrated Tread

Note how the Marathon angle non-skid tread is concentrated for hard service and economy. Note the built-up center and the tapering sides. *That's an exclusive Marathon feature.* But no doubt others will soon copy it.

The great angle tread is the master of wet streets, slippery and sandy roads. The angles grip in all directions. It's the year 'round tread.

Write us for our exclusive proposition and get a sample section of the tire and pure gum Red Tube.

Then judge which tire and tube you should sell.

Send for this book

If You Are a Dealer, this pamphlet will post you on the most up-to-date, complete and diversified line of small air compressors that you can add to your stock.

If You Are a Garage Man, it will show you the compressor you want for your own place—one exactly adapted to your individual needs and one you can depend upon.

If You Are a Car Owner, this booklet will give you facts on garage air compressors that will enable you to buy yours as intelligently as you buy your car.

The book is "Compressed Air in the Garage." It's free.

INGERSOLL-RAND CO.
11 Broadway
New York City
Offices the World Over

When Writing to Advertisers, Please Mention Motor Age.



The Marathon Tire & Rubber Co.
CUYAHOGA FALLS, OHIO

DISTRIBUTORS IN MOST LARGE CITIES

(110)

Do Your Own Welding!

Save time and money on repair jobs! Don't send out your repair work. You can now *do it yourself*—and save a lot of time for your customers and money for yourself.

Don't buy and wait for new parts! You can *make old parts as good as new* by using the

Cox Welding Outfit (For Welding and Carbon Removing)

Complete in every detail. Will do every possible welding job. Very simple in construction. Can be used on parts of iron, steel, brass, bronze and aluminum. Any average mechanic can become adept in its use in a short time. We furnish complete instructions with each outfit. It is *safe and sure*. Every job you do means—*Extra Profit for You*.

The outfit will pay for itself many times over. It means quick repair work—and *all of it done in your shop!*

The Cox Outfit is not only excellent for welding, but it can also be used to *Quickly and Completely Remove Carbon from Cylinders!*

Thus you have a dual outfit—a profit maker two ways! Its use is doubled. It saves time in two ways—and produces two profits!

Send for free catalog and full information NOW



See our exhibit at the New York Show

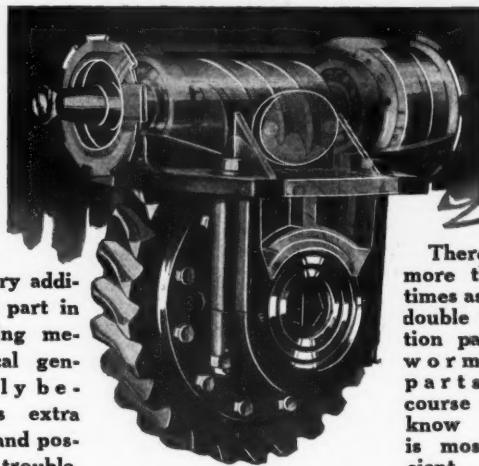
Cox Brass Mfg. Company Albany, N. Y.

1777 Broadway.....New York City
8445 Michigan Ave.....Chicago, Ill.
870 Woodward Ave.....Detroit, Mich.
1216 Van Ness Ave.....San Francisco, Cal.



You build Silence, Neatness, Simplicity and Efficiency into your vehicles when you equip them with the

SHELDON WORM DRIVE



Every additional part in anything mechanical generally be-tokens extra wear and possibly trouble.

There are more than 3 times as many double reduction parts as worm drive parts. Of course **YOU** know which is most efficient.

A CHAIN is no stronger than its weakest link. Every nut, cotter, washer, head pin casting, forging, chain link and rivet is a necessary unit of the assembly it composes. The failure of one of those units may mean the wreck of your truck, and perhaps the damage of property and the loss of life.

Only one-third the number of parts required for a Worm Drive that are required for a two-step reduction of the chain driven type. This is convincing proof that, all things being equal, the single reduction Worm Drive has a three-to-one chance of giving better service than a two-step reduction with three times as many parts.

But all things are not equal. The Worm Drive is a single reduction, transmitting the power direct from the motor to the rear wheels. It is the only drive in which it is possible to secure this result.

The Worm Drive conserves power because it is a single reduction. Every moving power transmitting unit works in oil, reducing friction to a minimum.

Sheldon Worm Drive is non-adjustable. The Worm carrier is machined exactly true by specially constructed machines.

If the carrier is not true, the Worm can not be assembled. Once assembled the Worm and Worm Wheel can be removed and replaced without disturbing their alignment. No adjustment to tamper with.

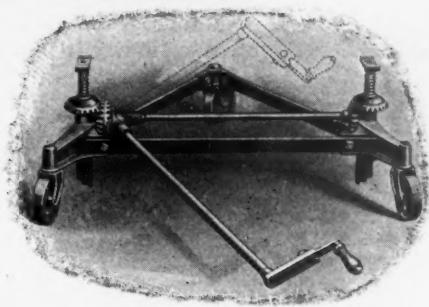
It is not necessary to provide adjustment for wear. The slight wear of the imported Worm and Worm Wheel only adds to its efficiency.

Of course, the Worm and Worm Wheel wear out, but not during the life of one truck. The experience of the largest user of Worm Drives has proven this.

Sheldon Axle Company Wilkes-Barre, Pa.

CHICAGO.....68 E. 12th Street
SAN FRANCISCO.....444 Market Street
DETROIT.....1215 Woodward Avenue

Let these—



Solve Your Storage Problems

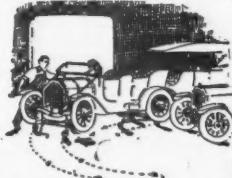
WEAVER Auto Twin-Jacks will cut your storage worries and expense in half and double your profits.

From 30 to 50% more cars can be stored upon a certain floor space if the cars are placed with these jacks.

One man with Weaver Jacks can also do the work of three in placing and manipulating cars, and can do it in less time.

For the Repair Shop

There is hardly a minute of the day that these wonderful jacks could not save money for you in your repair shop, wash room, or sample floor.



Your Customers Need Them

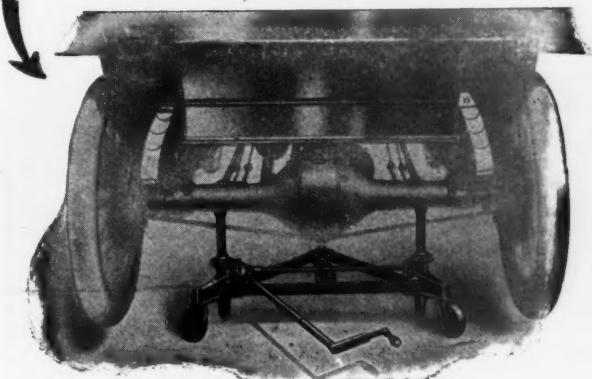
As an "accessory" for the individual car owner they are the liveliest retail proposition on the market. Why not get in on the profits?

BALL and ROLLER BEARINGS—Steel and Malleable Construction—lifting leverage 400 to 1—lifting capacity 4000—34-inch wheel base.

TWO for \$20

F. O. B. Springfield, Ill.
Liberal DISCOUNT to Dealers

Weaver Mfg. Co., Springfield, Ill.



The R-A-B Wire Clamp

No Tool Kit Complete Without One

Found as Regular Equipment On the Best Pleasure and Racing Cars

The R-A-B Wire Clamp is a tool no motorist should be without. From ordinary wire, it will make a clamp of any size, capable of withstanding any pressure. The operation is as quick as it is simple. Anyone can use an R-A-B. No more leaky hose connection! No more delays on the road from blowouts!

Could we produce any better evidence of this clamp's merits than the following letter?

Read This Letter!

The KISSELKAR

THE KISSEL MOTOR CAR COMPANY
HARTFORD AND MILWAUKEE, WISCONSIN

MILWAUKEE Oct. 14, 1913.

R. A. Beaudette & Company,
Chippewa Falls, Wisconsin.

Gentlemen:-

Having come in contact with the RAB CLAMPER, and knowing it's work and advantages, I wish to express my appreciation. I would call it a motorist's companion, and one of the primary tools of a kit.

The way in which it handles wire and the firm projectionless clamp it makes is remarkable. It's clamps are the best for automobiles or any water cooled motor using hose connections.

Yours very truly,

KISSEL MOTOR CAR COMPANY,
Per *ack. 24/11*

HR

Figure 1 shows the firm, graceful clamp this device makes. Note there are no projections on which to cut flesh or tear clothes. Figure 2 shows the device in the act of making clamp. Figure 3 shows how a blowout can be quickly repaired with this clamer. These are only a few of the unlimited uses to which this clamer can be put. At its extremely low cost you can't afford to be without one.

Price \$65 Each



Fig. 1

At all dealers', or sent prepaid on receipt of price.

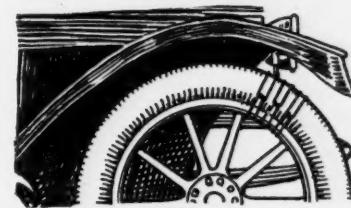


Fig. 3



Fig. 2

R. A. Beaudette & Company
Chippewa Falls Wisconsin

Simple, Efficient and Economical

The
K-W
Electric Headlight Outfit, \$40

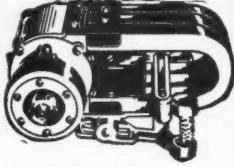
Complete Outfit: Generator, Head Lamps, Switch, Wire and Bulb

Easy to Install. Mount in Any Position

Runs in Either Direction

Has Only One Moving Part

No Commutator or Brushes



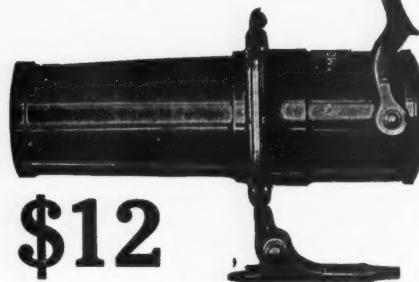
Gives 2.1600 C. P. Headlights

Send for Descriptive Folder P. We Also Make a
K-W Ford Electric Headlight Outfit, \$15
FOR FORD CARS WITH FLYWHEEL MAGNETO
and the famous K-W Master Vibrator
The Standard by Which All Others Are Judged

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The Hand Operated Horn



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NO Adjustments
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WESTON MODEL 280
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and are in every way the most accurate, durable, reliable and altogether satisfactory for testing batteries and electrical circuits

Send for 30-page bulletin No. 8 describing these and other small instruments.

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"The ACME of PRECISION is The WARNER TRANSMISSION

"Warner Gears—Standard for Years"

We shall exhibit at the coming automobile shows a complete line of our product.

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WARNER GEAR CO
MUNCIE - IND.

5 PoundsTrade Mark
Registered**Which for You?**

Many a car is not equipped with a towline, as all cars should be, because the owner doesn't want to cumber it up with heavy, bulky manila rope. Basline Autowline is light, neat, compact and

Coils Up Flat Under a Cushion

It is 25 feet of famous Yellow Strand wire rope. Pulls a 4,000-lb. car up a 20% grade. Starts a stalled car on its own power. \$3.75 at your supply dealer's. Buy one today and be equipped for every emergency of the road.

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Manufacturers of world-famous Yellow Strand Wire Rope



McCORMICK POWER PLUGS

Deliver more power and minimize fuel consumption

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they completely explode a wide range of gas mixture.

Let us prove this by sending you a set on approval.

PRICE \$2.00 EACH

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Neither
Rain, Mud
Nor Dust
Can Harm

your luggage when it is
carried in the new rain-proof, water-proof

Kamlee Auto Trunk

"Made by Trunk Makers Who Are Motorists"

Embody every desirable feature—strength, lightness, durability, beauty. It adds to rather than detracts from the appearance of any car.

Consider these exclusive Kamlee features before you buy an auto trunk, then you'll surely select a Kamlee: patent drop front—no lifting of lid—patent inter-locking edge makes it air-tight, dust-proof, rain-proof; no straps to bother with in opening; fitted with standard suit-cases permitting removal of one party's luggage without disturbing others.

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234 Broadway, Milwaukee, Wis.

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Gold Diamond
Inlaid Right on
Front Cover

STANDARD FOR 59 YEARS

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Jones Wheels

"Best on Earth"

A broad statement, but we stand by it.

THE NAME OF JONES
AS APPLIED TO
WHEELS MEANS THE—

**First—Last and
All-the-Time Word
In Wheels**

"Kantsamore"

Buyers of Vehicles should say—
"Give me wheels made by

Phineas Jones & Company
Newark, New Jersey, U. S. A.

Starts — Lights — Ignites

REMY

Six Volt System—Does-It-All

After inspecting the new cars at the coming Automobile Shows, you will insist on Remy equipment, not simply because it will crank engines, light the car or fire the engine, but BECAUSE:

This apparatus is designed by O. F. Conklin, the recognized authority on electrical apparatus for motor cars.

This apparatus is built under the factory management of *Men Who Know*.

The responsibility of the complete electrical apparatus is assumed by one reliable, experienced company.

A country-wide system of quick and efficient service is available for Remy users.

We are the only concern building the complete apparatus, either as a whole or in any combination—starting motor—lighting equipment—magneto, or magneto type battery ignition (generator and storage battery). (The starting and lighting equipment is sold only to motor car makers.)

Write for our magneto (any make) exchange offer.

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General Offices and Works, Anderson, Indiana

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Make Your Car Ride Easier



GET 50 per cent more resiliency and longer life out of your springs by properly lubricating them. You can do it quickly and easily with the—

Knowlson's Spring Leaf Spreader

made of the highest grade drop forging, nickel plated, polished and well finished—adjustable to any size auto spring—separates the leaves just enough to insert the lubricant—does away with the jacking up of the car—used as a clamp for broken springs.

\$1.50 all dealers
or sent prepaid



Spring Leaf Lubricator Co.
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"A Detail of Perfection"

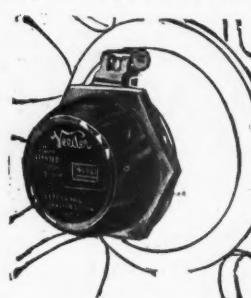
is positively necessary in any instrument used to keep tabs on cost of upkeep. Tires, gasoline or "juice," and lubrication cost can only be correctly ascertained with the VEEDER HUB ODOMETER—a perfected instrument that can't be fooled with.

Neat, durable and compact, it can be easily attached. **\$25.00**
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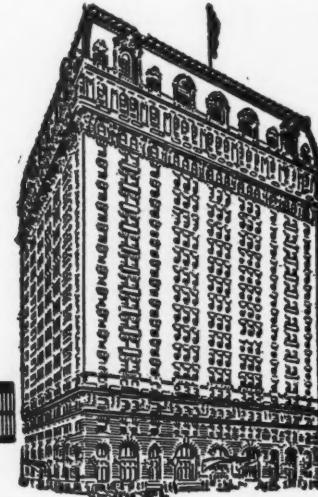


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C. H. VEEDE'R, President D. J. POST, Treasurer
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CHICAGO'S FINEST HOTEL

ERNEST J. STEVENS, Vice-Pres. and Mgr.

Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON	Room with detached bath.....	\$2 to \$3 per day
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TWO PERSONS	Room with detached bath.....	\$3 to \$5 per day
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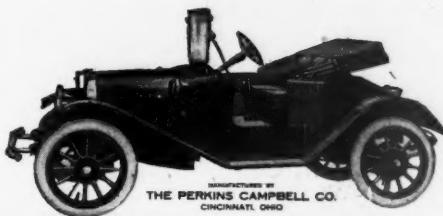
TWO CONNECTING ROOMS WITH BATH

Two persons	\$5 to \$8 per day
Four persons	\$8 to \$15 per day

SUITES \$10 to \$35 per day

LA SALLE AT MADISON STREET, CHICAGO

CAMPBELL Seat Covers

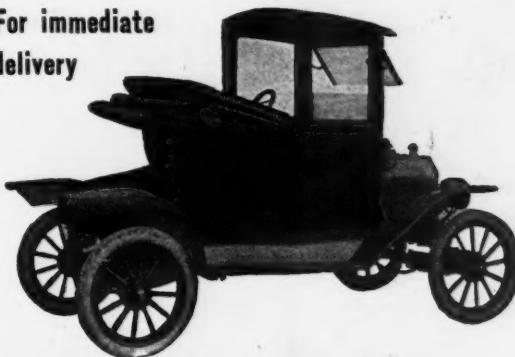


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For immediate
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**A Low
Priced
Landaulette
Coupe for
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Light, durable, well
designed, comfortable, with folding
top. A practical body for all sea-
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Suppose you were on a pitch dark road—and your tail light went out without your knowledge? Suppose behind you came a big seven passenger car on a joy ride _____. Don't let it happen to you.

The Rear Light Alarm will Warn You

If your light goes out. If a filament or bulb breaks, if the connections are faulty or wires broken, the buzzer on the REAR LIGHT ALARM is set in operation. It buzzes loudly and incessantly until the trouble is remedied. It's the watch dog of your tail light. Made of the best materials—tested for accuracy at the factory and guaranteed for the life of your car. Your dealer carries it.

If not, we'll ship it postpaid on receipt of price.
For oil lights, \$3.50. For electric lamps, \$5.
Outfit to change oil light to electric with instrument, \$10.

Write for Our Catalog

Dealers wanted to handle this live accessory. Write us.

The Guaranteed Specialties Co. Kinney Building
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**PLUG THAT
RADIATOR LEAK
PERMANENTLY**

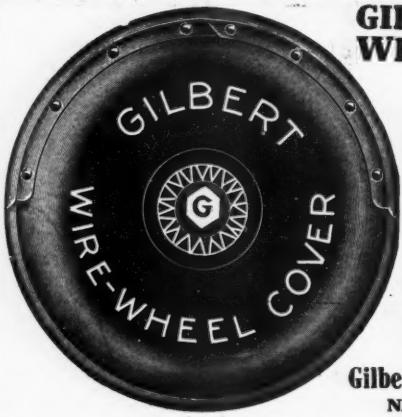
FINDS
THE LEAK
AND
FIXES IT



Makers of



BRASS-KOTE



GILBERT WIRE WHEEL COVERS

Protect tire, rim and spokes and have leather re-enforcement at hub cap.

No straps or complicated adjustment.

Send for latest catalogue describing tire covers and carriers of all styles.

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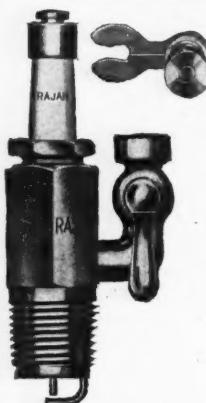
Newest Designs; Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

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Exclusive Motor Truck Builders
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Cut Gears of Quality Complete Differentials

NEW PROCESS GEAR CORPORATION
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RAJAH PRIMING PLUG

Priming cup soldered in firmly to prevent leaking.

Material and workmanship of the highest grade—fully up to the standard set by us for over ten years.

Terminals as shown furnished with every Plug.

\$1.50

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Model T Runabout \$500
Model T Touring Car 550
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With Full Equipment f. o. b. Detroit

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You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

Use the New Positive Lock Stop TWITCHELL AIR GAUGE
and save your tires.



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For sale by Jobbers, Dealers, Garages, or
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Save Money by Economizing Gasoline

Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment.

Made by the oldest manufacturer of carburetors in America

ESTABLISHED 1895
BYRNE, KINGSTON & COMPANY, Kokomo, Ind.



Keep Your Eye Fixed on Quality

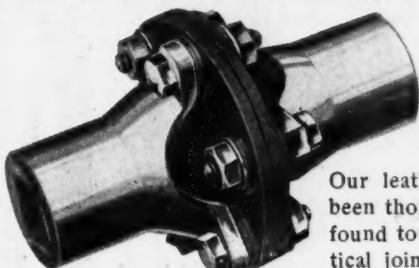
when you go tire-buying. For after all, there is only one thing that measures the service you get from a tire—and that is *quality*. We put real *quality* in Republics so you will get real service out of them. The best proof of this is furnished by the men who use them.

REPUBLIC STAGGARD TREAD TIRES

Republic Staggard Tread, Pat. Sept. 15-22, 1908

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Branches and Agencies in all the Principal Cities

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Style L for Cyclecar

Our leather disc type has been thoroughly tested and found to be the most practical joint for the cyclecar on account of its simplicity, lightness and low cost.

Write for our prices and

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Gyroscope Principle

The New Jones Speedometer Unaffected by Heat or Cold

You want absolute accuracy in speed readings just as you want the right time from your watch. There is one way to get it—get a New Jones.

Any motor car maker will equip with it if you state plainly you want nothing else, no matter what speedometer he may list in his catalog as equipment.

Write us for facts, tests and experiments that show Jones supremacy beyond question. Then specify what speedometer you want on your car this spring.

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Four-cylinder, 32-40 h. p., 120-inch wheel base, body types and equipment to meet every requirement. A rational, logical car for touring and city use. Years of satisfactory service have proved its economy in tires, fuel and upkeep — plus smooth, delightful operation and durability. Price, \$3,000.



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For Transmissions and Differentials

Lengthens the life and increases the mileage of any car.

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TIRE PUMP

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In this new process, the steel is worked both longitudinally and transversely. So we get superior strength and toughness. We use this process exclusively in our Chrome-Vanadium Brand of Springs.

Find out more about them. It will make a tremendous difference in the riding qualities of your car.

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In five years not one Cleveland - Canton Chrome - Vanadium spring returned because of breakage or settling.

Let us send you full particulars

The Cleveland-Canton Spring Co., Canton, Ohio, U.S.A.

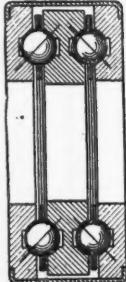
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have established the standard of electric car construction for all time to come.

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Distributors
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We Specialize in High-grade Automobile Parts

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REG. U. S.
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Regular, \$1.00
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**Western Electric
PITTSFIELD**

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The cylinder dash coil
movable and interchangeable. Each unit case is of special construction, with the result of a splendid appearance. Vibrator of special high frequency design, operating with a hammer-like blow that is positive. Vibrator is furnished with iridio-platinum sparking points. Condenser and windings are so proportioned as to obtain maximum spark with lowest current consumption. Each coil is equipped with a kick switch that is simple, strong and positive in action. The cover is securely held in place by a side catch of special design.

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No. 113	Three cylinder dash coil	30.00
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**PITTSFIELD SPARK COIL CO., Pittsfield
WESTERN ELECTRIC COMPANY
New York and All Principal Cities**



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prevents all friction of leaves, elements squeaking, causes springs to hold their temper longer, prevents rust and makes cars ride easier.

In ordering Whitmore's Compositions, state definitely for what part of car lubricant is wanted.

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Ball Bearing

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MARBURG BROTHERS, Inc.
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When your car is Apelco electric lighted as well as started you'll enjoy motoring as you never have before. Simple in construction, reliable and dependable, economical to operate.

Send for full information. There's an Apelco Motor Boat and also a House Lighting Outfit that's just as reliable. Apelco products are the standard by which others are judged.

The Apple Electric Company
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50c. IS ENOUGH

The "Black Eagle" Spark Plug marks the dawn of a new era. From now on The Price of Spark Plugs will gravitate to Fifty Cents.

Why not be a pioneer in your territory?

The reason is apparent—none better at any price. Made in all standard threads mailed upon receipt of price.

THE STANDARD CO.
Torrington, Conn.



BLACK EAGLE

Spark Plug



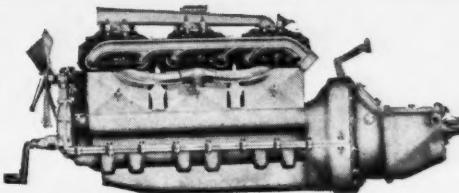
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HERZ PLUG

"BOUGIE MERCEDES"



BLUE STONE & STEEL
Guaranteed One Year
Your Dealer or HERZ & CO. New York



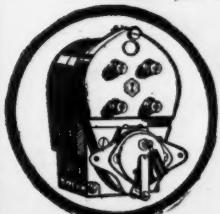
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The performance of Eisemann Ignition Systems during the Indiana-Pacific Tour justifies every claim we have ever made for Eisemann efficiency and dependability.

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are good tires

They cut down tire bills

GOOD YEAR



AKRON, OHIO

This name on Automobile Tires and Rubber Accessories signifies inherent qualities of material and workmanship that insure the maximum of service at the minimum of expense. (673)

THE GOODYEAR TIRE & RUBBER CO.
AKRON, OHIO

The Benham Steering Gear for CYCLECARS

Adapted to Overslung or
Underslung Cyclecars

Adapted to
Either Right
or Left Steer,
also Center.



Send your specifications and requirements for quotations. We can make immediate deliveries.

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Safety when you need it
Low-cost mileage always

GOODRICH SAFETY TREAD TIRES

The tread that makes the brake effective

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*There is nothing in Goodrich Advertising that
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Electric Self-Cranking
Electrically Lighted
Four Forward Speeds

The Herreshoff six was the first light six built and is today conceded the best example of skillful design in combining strength with reduced weight.

"Six-Forty" Touring Car and Roadster \$1850 - 7 Passenger \$1900
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The
Thoroughbred
Car



WINTON SIX

The Fashion Plate

You can safely buy a Winton Six, for it is now in its seventh year of success—a thing impossible if it hadn't been right; made by the company that founded the industry, and the first in the world to concentrate upon six-cylinder cars exclusively. The newest model is one of remarkable beauty and excellence—the automobile fashion plate. Send for 64-page catalog.

THE WINTON MOTOR CAR COMPANY
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WORLD'S FIRST MAKER OF SIXES EXCLUSIVELY

METZ "Twenty-Two" Roadster

THE GEARLESS CAR

"No clutch to slip—no gears
to strip."



\$475

Completely Equipped

Center control, left-hand drive, 4-cylinder 22½ H. P., water cooled motor, Bosch magneto, standard artillery wheels, best quality clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 60 miles per hour on the high speed, 28 to 32 miles on 1 gallon of gasoline, and is a wonderful hill climber. A strong, reliable, stylish, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory. Write at once for Book "K" and particulars.

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Renewals of HESS contracts for 1913 from past users and an increasing HESS demand among new manufacturers, is ample proof of the stability of HESS Quality.

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Standardized Transmissions

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Covert Motor Vehicle Co.
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Raises or lowers top in one minute—"Record operation, 30 seconds." Lifter handles one side, you the other. Top can't slip—Bow can't break. Simple—Strong—Necessary.

Dealers—They will sell as fast as you can demonstrate. Write.

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HERE IS THE COMPLETE IDEAL PACKAGE

FOR RE-PAINTING A FORD CAR

Retails for \$6.50

Save 75% of the Usual
Painting Cost

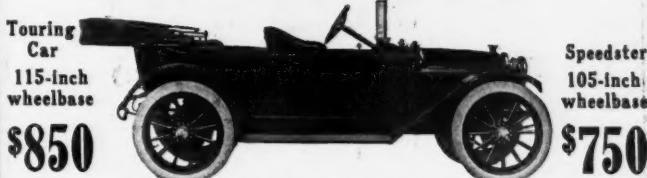
THE package contains fifteen articles—sufficient material to make an old Ford or any other car of similar size look absolutely new. Experience is unnecessary—paint the car today, let it stand over night, and you can use it tomorrow.

For sale wherever Ford Cars or Accessories are sold. Distributors in leading cities.

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TOURING CAR
115-inch wheelbase
\$850

SPEEDSTER
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VULCAN MFG. CO., Painesville, Ohio

de Soto Cycle Cars **\$385**

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Now
to Be Sure
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The fastest, neatest two passenger tandem car to be had.
Speed, 40 miles per hour.
35 to 50 miles per gallon of gasoline.
Write today for particulars and specify exact territory wanted.

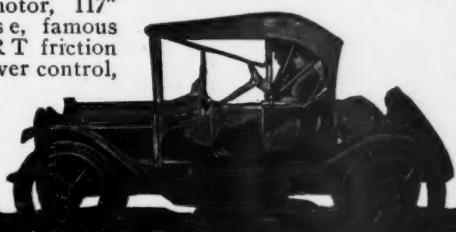
de Soto Motor Car Company, Auburn, Ind.

LAMBERT

The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1365 (fully equipped) stands

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More power - Less fuel - Wider range
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"SPICER" on universal joints means quality, and "SPICER" quality has been a standard ever since universal joints have been manufactured.

Let us quote you prices on your requirements.

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Service and Satisfaction

They are built to last and
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Main Office and Factory

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Salesrooms: 1887 Broadway, N. Y.
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Bull Dog
Non-Skid

SIXTH YEAR McFARLAN SIX

The only medium priced six that is not
a new untried model

Better Than The Price
\$2590

McFARLAN MOTOR COMPANY Connorsville, Indiana

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For sale by Tire Mfrs., Jobbers and Dealers or
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PAT'D MAR 11, 1898, JULY 16, '99. OTHER PAT'S. PENDING
SCHRADER UNIVERSAL
TRADE MARK REG. IN U. S. PAT. OFFICE
TIRE PRESSURE GAUGE

MADE BY A. SCHRADER'S SON, INC., NEW YORK

The Pilot "THE CAR AHEAD"

Three Great Models—Pilot 50—4 cylinder, 4 1/4 x 6—59 H. P. 120 inch wheelbase, roadster and touring car—\$2250. Pilot 50—roadster—4, 6 and 7 passenger bodies, 126 inch wheelbase—\$2500. Pilot 60—6 cylinder, 4x6, brake test 67 H.P., 132 inch wheelbase, roadster, 4, 6 and 7 passenger touring cars—\$2750.

THE CAR WITHOUT A MECHANICAL DEFECT

Teeter "T" Head Motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Eisemann Magneto, Carter Carburetor, handsome jewel bodies with ventilating windshield. Completely equipped with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States. Write for our beautiful art book showing cars in detail.

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Richmond, Indiana

The Borland Electric

rear axle—"quiet as silence itself". Greater power motor—immensely INCREASED
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When you buy SCHAFFER BALL BEARINGS you are not experimenting because SCHAFFER BALL BEARINGS have for years been recognized as the standard of bearing quality. They are made in Germany of the best steel and are now in universal use throughout the world

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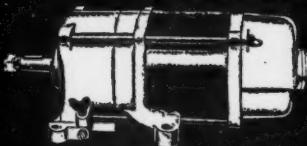
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Manufacturers of 1914 Models
Don't omit a SPARKS-WITHINGTON Fan from your 1914 specifications. Our One-Piece blade, ball-bearing, radiator fan assemblies cool the motors of more high-class cars than any other fan on the market. There's a reason. SPARKS-WITHINGTON Fans deliver the greatest volume of air with the least H. P. consumption of any fan obtainable. Furthermore, their one-piece construction is positive insurance against blades which loosen, become detached and fly off. Undoubtedly one of our ten standard models is just what you have been looking for. Catalogue and detailed blue-prints on request. Get in touch with us.

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JONES ELECTRIC STARTER CO.
ADAMS & LOOMIS STS. CHICAGO, ILL.

THE TUGBOAT OF LAND COMMERCE"

SOLVES THE
HEAVY TRUCKING
PROBLEM

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If these batteries do not give absolute satisfaction, we will supply new ones without cost, give credit for same, or refund the purchase price, including transportation charges.

This Guarantee means real protection. Sold direct, if not at your dealer's.

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"Get
INTERLOCKS Old Chap"
Prevent Blow-Outs and Punctures

**Double Your Tire Mileage
Save Half Your Tire Cost**

Interlock Inner Tires are easily placed between the outer casing and inner tube, and Stop Tire Trouble. Write for Interlock Booklet that gives full information, valuable tire facts, prices, testimonials of tire experts, Interlock users, etc.

DOUBLE FABRIC TIRE CO.,
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Auburn, Ind.

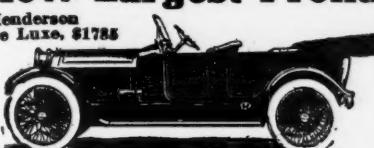
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KEATON NON-SKID TREAD
has four times the wearing service of the ordinary non-skid. Users will tell you that they have run Swinehart Keaton Non-Skid Tread Tires a whole season without having them lose their anti-skid effectiveness. Call at any one of our stores and investigate them. We also make a complete line of Smooth Pneumatic Tires of best quality. Branches and distributing agencies in all leading cities.

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How Largest Profits Are Made

Henderson
De Luxe, \$1755



We have some interesting facts in connection with increasing your car sales and profits.

Selling some cars, you may sell large numbers—and still your yearly business shows a loss.

Through merchandizing strategy we have remedied these flaws. May we tell you about these things and about our kerosene-burning car, equipped with wire wheels, cowl dash, cowl gasoline tank. Left drive, center seat control—the most salable car offered today.

Wire or write for the facts

Henderson Motor Car Co.
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THE RUTENBER MOTOR

MANUFACTURED SINCE 1901 FOR HIGH GRADE AUTOMOBILES AND TRUCKS

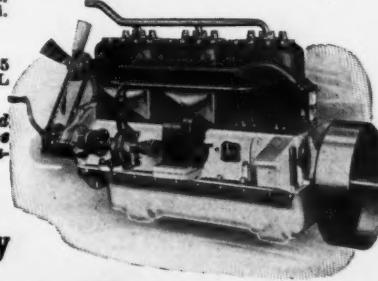
$8\frac{1}{2} \times 5\frac{1}{2}$ four and six cyl.
 $4\frac{1}{2} \times 5\frac{1}{2}$ four and six cyl.

Standard or Unit
and

4×4 , $4\frac{1}{2} \times 5$ and $4\frac{1}{2} \times 5$
Standard Types. All L
Head 4 Cycle.

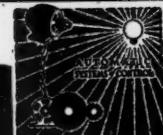
Manufacturers are invited
to investigate our services
and our facilities. Literature
on request.

**The Rutenber
Motor Company**
Marion, Indiana



WARD-LEONARD SYSTEM

WARD LEONARD



Lighting - Starting

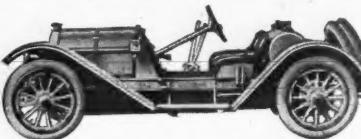
Faultless Lighting
Infallible Starting

WARD LEONARD ELECTRIC CO.
BRONXVILLE N.Y.

Corcoran Lamps

GAS, OIL, AND ELECTRIC
CORCORAN LAMP CO.
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TYPE 35
SERIES J
RACEABOUT



GUARANTEED
SPEED - MILE
in 51 SECONDS

MERCER

We invite your inspection of all Mercer models at New York Automobile Show, Jan. 3 to 10. Space B-9, Grand Central Palace.

Series H, Close-Coupled Five-Pass.
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NEW LIFE!

When the engine is dead, the question which every autoist wants answered is this: "How can I put new life into it instantly?" The IMPROVED MICHENER GASOLINE SAVER and PRIMER answers this question correctly. By putting a little gasoline in the mixer bowl and giving the Gasoline Saver valve the smallest opening, when the motor is cranked—either by hand or by means of a self-starter—the piston draws this rich mixture of air and gasoline right to the spark plug points, where it ignites instantly.

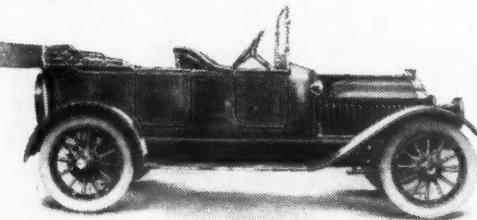
RESULT: No delay, no worry. Cold weather has no terrors for the autoist whose car is equipped with my device.

A card will bring you full information.

\$5.00, Dash Control; \$6.00, Steering Post Control, postpaid. Brass or nickel finish. When ordering, state which side of motor carburetor and steering post are on.

Prices after (Dash Control)..... \$5.50
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America's most comprehensive line. Every car completely equipped. 3 sizes chassis—10 body styles. Price range from \$925 to \$1495

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HERFF-BROOKS CORPORATION, Indianapolis, Ind.



The Standardized Car

*The car that started the
stampede
to standardization*

A Cole franchise is a valuable asset to any dealer. Find out about it.

Cole Motor Car Co. of Indianapolis



\$1490!

The New Auburn "40" is 1914's startling value—a large, beautiful, 120-inch wheelbase car, equipped with every luxury and convenience of high-priced cars. At \$1490!

NOTE THESE ADVANCED FEATURES:

Left Drive
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Electrically Self-Cranked
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36x4 Tires; Demountable Rims
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Extra Roomy Tonneau—29 inches
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"32" Touring car, fully equipped.....	\$1050
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With same options as above.....	1300
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KRUPP AUTOMOBILE CRANK SHAFTS, STEEL FORGINGS AND FRAME MEMBERS, GEAR BLANKS, KRUPP BAR STEEL BALL MILLS, TUBE MILLS AND OTHER MACHINERY



Chrome
Nickel
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Round Bars in Stock, having a Minimum Elastic Limit 95,000 lbs. per square inch. This steel can be Oil or Case Hardened so as to have an Elastic Limit of over 200,000 lbs.

Use this "TOUGHEST STUFF" and eliminate the Breakages you are now having

THOMAS PROSSER & SON

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KRUPP STEEL LOCOMOTIVE TIRES AND CAR WHEEL TIRES, CRANK SHAFTS, STEEL FORGINGS AND CASTINGS, STEEL TIRED CAR WHEELS, PROSSER BOILER TUBE EXPANDERS

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A discriminating public has voted in favor of Solars—the quality motor lamps.

Backed by 15 years of specialization. Found on more high-grade cars than all other makes of lamps.

A Solar Lamp for every motor need.

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BUDD ALL STEEL BODIES

represent the last word in the art of truck body building. They stand for strength, stability, sturdiness and efficiency. Made entirely of steel, they will not rot or crack. They cannot warp or split. They will stand the maximum use or abuse and are practically indestructible. They eliminate fire risk. They are light in weight and easy on tires—pleasing in design and attractive. Summed up in a word, they give the highest degree of Service.

They are made in many styles—of any desired capacity. Estimates promptly furnished. Write us today for full information.

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Motors G-B & S Motors

We beg to announce our latest four cylinder Unit Power Plant.

This Motor includes the recognized engineering practice, here and abroad.

"Craftsmanship of long experience is the result of this distinctive Power Plant."

Detailed information on request, and we are in a position to make prompt deliveries according to contract.

GOLDEN, BELKNAP & SWARTZ CO.
DETROIT, MICH.

Wisconsin Motors

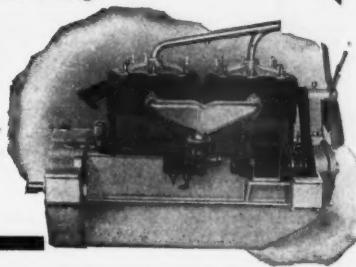
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ROAD CHAMPION OF AMERICA

The Tacoma, Santa Monica, Elgin and Corona road races were won hands down by Stutz cars equipped with the consistent Wisconsin Motor—the drivers never raising the hood. Winning all these big road events of the year has accorded Wisconsin Motors the title of Road Champion of America. Write for catalog describing the following sizes:

3 1/4" x 5"	4 cyl.	Emilic
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5 1/4" x 5 1/2"	6 cyl.	Emilic
5" x 5"	6 cyl.	Emilic
4 1/4" x 5"	6 cyl.	T Head
5 1/4" x 7"	6 cyl.	T Head

Wisconsin Motor Mfg. Co.
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Air Compressors

For
Private and Public
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Single and Double
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Air and Water
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FINISHED CRANK SHAFTS COMPLETE CONNECTING RODS COLD DRAWN STEEL SHAFTING

Screw Stock, Flats, Squares,
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FINISHED MACHINE KEYS - MACHINE RACK

All material finished to a
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KISSELKAR TRUCKS

Complete Line of Commercial Vehicles

All type bodies—special bodies designed. Unexcelled for service, efficiency and economy. KisselKar Trucks have great reserve power. Low fuel cost; sizes to give more economical service under all conditions.

1500 lbs. 1, 1 1/2, 2 1/2, 3 1/2 and 6 Tons

KisselKar Service Buildings at principal points throughout the U. S. are equipped to give an unusual service to owners of KisselKar Trucks. Let us analyze your haulage problem and show you how to make a big saving.

Write for Catalog—Over 200 Styles

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Doris
Built to last

THE SILENT CAR

BUILT TO LAST Attention, Agents!!

We are offering a big, liberal proposition and unusual sales help to Agents on the

1914 Dorris Truck & Pleasure Car
We sell "through" the dealer and not "to" him. Write today.
DORRIS MOTOR CAR COMPANY

St. Louis, Mo.

Reo the Fifth

R. E. Olds' famous car—the leading car in its class. The latest model sells at \$1175, completely equipped—electric starter and electric lights. 30 to 35 horsepower.

R. M. OWEN & COMPANY, General Sales Agents
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The Searchlight Gas Co.

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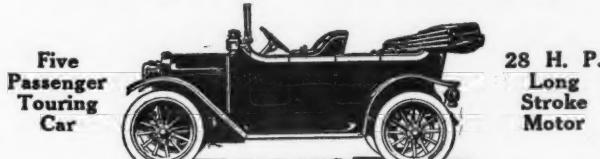
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The Detroiter— \$850 and \$900
Completely Equipped



28 H. P.
Long
Stroke
Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car

BRIGGS-DETROITER COMPANY, 455 HOLBROOK AVE., DETROIT, MICH.

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Skid Blowouts

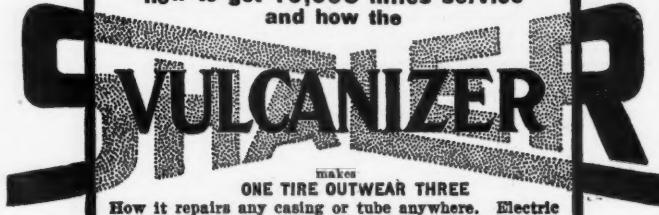
Rimcuts
Punctures
Wearing
Off
of Rubber
NIT

Each section 2 in. wide. They hook to rims. Try two or three sections over any old blowout.

Special Prices to the First in New Territory
KIMBALL TIRE CASE CO., 173 BDW., COUNCIL BLUFFS, IA.

Get this book on tires-FREE

Gives a remedy for every tire emergency—is quoted as authority by foreign and American auto journals. Tells how to get 10,000 miles service and how the



How it repairs any casing or tube anywhere. Electric vulcanizers for use on lighting current—steam vulcanizers if electricity is not available. The only vulcanizers that any one can use safely because of the exclusive feature, an automatic temperature control that protects the tire. Send today for a copy of "Care and Repair of Tires" while the edition lasts.

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Six Cylinder, 65 H. P.
Equipped with Vulcan
Electric Gear Shift

Four Cylinder, 40 H. P.
Equipped with Vulcan
Electric Gear Shift

HAYNES

America's First Car

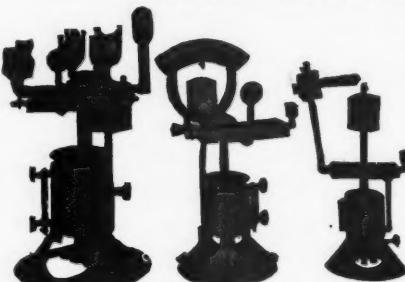
Our advertising campaign will send a buyer into your showroom more than half convinced that he should own a Haynes; the sale, however, results only from a successful demonstration; it is our firm belief that as a Haynes dealer you possess more than a sufficient number of convincing arguments to make every demonstration result in a quick and profitable sale.

May we tell you why we believe this?

THE HAYNES AUTOMOBILE CO., 2 Main St., Kokomo, Ind.

HAYWOOD STEAM VULCANIZERS

THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

Plants from
\$25 to \$500

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TRADE MARK
NON-FLEEB OIL
REGISTERED
UNITED STATES
SAFETY OILS

because your car is NEW,
than to have to do so be-
cause your car is prematurely
OLD.

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Philadelphia, Race & Broad

Cartercar

Gearless

A big, strong, powerful car, having all those refinements and up-to-date features that make the Cartercar a continual source of pride and satisfaction to the owner.

The Cartercar Gearless Transmission insures the utmost ease in handling with no jerking or jarring clutch and clash-ing or stripping of gears.

Built in various body types
\$1250 \$1700 \$2000

CARTERCAR COMPANY
PONTIAC MICHIGAN

Model "T" Ford Coupe
A new sensation in Ford Specialties



Prices right
Write today

Dept. "H"

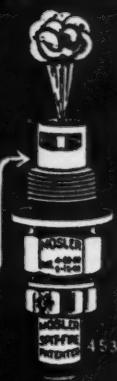
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INDIANAPOLIS, IND.

Mosler Spit Fire Plugs are the **BEST**

FOR 13 YEARS HAVE BEEN LIKE THIS

INSIST ON OUR GENUINE PLATINUM POINTED PLUGS

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CONNECTICUT

Master Vibrator For Ford Cars



A dependable master vibrator at a reasonable price. Makes starting easy—motoring becomes a pleasure.
Flush Type—Price . . . \$9.00

Delivered upon receipt of price
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Connecticut Tel. & Electric Company, Inc., Meriden, Conn.



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DETROIT, MICH.**

SALISBURY
AXLES WHEELS
TRANSMISSIONS



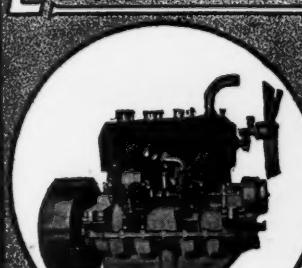
Salisbury Wheel & Mfg. Co.
JAMESTOWN, N.Y.

American Axles

Found only on high grade cars

THE AMERICAN BALL-BEARING CO.
Cleveland, Ohio

Continental Motors



A WORLD STANDARD FOR QUALITY AND SERVICE
AND 6 & 8 UNDER THOUSAND
Continental Motor Mfg. Co. DETROIT

Pullman "Little Six"

The Only Genuine Streamline Motor Car Built In This Country

This epoch making automobile with VULCAN ELECTRIC GEAR SHIFT & WIRE WHEELS priced at only \$2400.

Fours and Sixes—\$1775 to \$2850

Write or Wire

PULLMAN MOTOR CAR COMPANY, York, Pa.



Buyers Guide

A Directory for the Guidance of Motor Age Readers



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Write for catalogue and prices.
We can save you money.
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MR. JOBBER:

Here is a high-class tire holder for the rear of Ford cars. Don't fail to catalog it. Do you want circular and full proposition? Ford distributors, write us about it. Quickly attached to frame; no straps; combines the lock; makes a snug fit.

SMALLEY DANIELS
803 Woodward Avenue
Detroit, Michigan



Main Office: DETROIT, MICH.
Pacific Coast Agency
George L. and J. A. McPherson, Portland, Ore.

An Extraordinary Business built up through Motor Age

"It will probably please you to know that from advertising carried in five journals, 98% of all business we have received has come through MOTOR AGE. We will say further that we have done a most extraordinary business considering the very modest manner in which we started."

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In Stock or Order
Send for New Catalog.
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NEW CATALOG 300 PAGES

Now Ready
MOTOR CAR
MOTOR CYCLE
MACHINISTS
BICYCLE
SUPPLIES
AND BICYCLES

WHOLESALE ONLY DEALERS, GET YOUR NAME IN

MOTOR CAR SUPPLY COMPANY
1451-1453-1455 Michigan Ave., Chicago

AUTO-TOP FABRICS OF EVERY DESCRIPTION

SAMPLES AND PRICES ON REQUEST

L. J. MUTTY CO., Boston

GUARANTEED FISK CASINGS, 36 x 4 Q. D. CLINCHER HEAVY CAR TYPE.

WHILE THEY LAST AT \$20.00 EACH.

The above casings have run less than twenty-five miles and carry the factory serial number and are fully guaranteed.

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Hoyt Electrical Instrument Works

Makers of

HOYT AMMETERS AND VOLTMETERS

Penacook, New Hampshire

Automobile, Motorcycle and Bicycle Supplies

Ask for catalog "M"
Dealers only

THE BECKLEY-RALSTON CO.
Mich. Ave. & Randolph St., Chicago

The PARISH & BINGHAM CO. PRESSED STEEL

FRAMES

Write for Estimates.
CLEVELAND, OHIO



Use Polo Pneumatic Tire Alarms

Rim Cutting Entirely Done Away With —Lessens Blow-Outs and Blisters

Easily and quickly attached to valve stem, they take the place of the cap. Compactly made and reduced to the smallest possible size compatible with strength and durability. Running on low air pressure shortens the life of a tire more than any other cause. The Polo Pneumatic Alarm advises you instantly when the pressure falls below a given point, by giving vent to a shrill whistle.

Sold in sets of four, at \$6.00 per set
We invite inquiries from dealers and auto users. Write for descriptive folder.

Polo Pneumatic Alarm Mfg. Company
CLEAR LAKE, S. D.

THE THREE DOLLAR SET KIT



set has no equal. It fills a long-felt want. A high-grade wrench with extension shank and seven strong steel sockets. Extra sockets may be had if desired.

Ask your dealer, or write us

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CLASSIFIED ADVERTISEMENTS

The Trading Center
of the
Motor Car Industry

MOTOR AGE

Rates-25¢ per line
Minimum Charge \$1.00
6 words to a line

Cars For Sale

A LATE DOUBLE "M" FORTY HORSE-
power White Steamer, fine condition and
fully equipped, including kerosene burner.
Has not run three thousand miles. Will sell
cheap. Address Box D 469, c/o Motor Age. w

AUTOMOBILISTS, ATTENTION!

HOLIDAY

BULLETIN NUMBER EIGHT

will be off the press Monday, Dec. 15. If you are not on our mailing list, write, phone or call for this bulletin at once. It contains used cars of many makes at bargain prices and you cannot afford to be without it.

USED CAR DEPARTMENT,
THE LOCOMOBILE COMPANY
OF AMERICA,

2000 Michigan Ave. Phone Calumet 380.

BUICK, 1,500 LB. DELIVERY WAGON,
new solid tires all around, recently been
repainted. Will sell at a big bargain.
D. Condon

2635 Wabash Ave., Chicago

CADILLAC NEW 1913 COUPE, A1 CONDI-
tion, fully equipped, \$1,800. Wire if interested.
R. C. Dugan, Marion, O.

FOR QUICK SALE. ONE HUDSON "54"
1913 Six Cylinder Touring Car. Perfect condition. Run 1,000 miles. Seat covers. Five Tires. Electric Lights and Starter. Car Cost, with Extra Equipment, \$2,558. Will Sell for \$1,800 Cash.

One New Hudson "34" Four-Cylinder Touring Car. Electric Lights and Starter. Sold for \$1,875. Will Sell for \$1,500 Cash. This Car Has Never Been Used.
A. R. Manley,
Mt. Carmel, Ill.

FOR SALE—BRAND NEW STEARNS-
Knight, six-cylinder, four-passenger car. Never taken off the floor; equipped with Silverton cord tires; painted gray with black stripes; special body design; cost \$5,000.00, take \$4,100. F. O. B. Kansas City, Missouri. Address No. 1010 Rialto Building, Kansas City, Mo.

FOR SALE—MODEL Y STEVENS-DURYEA,
rebuilt with new top, 1912 mud guards and fenders. Run 13,800 miles; guaranteed like new, \$2,000. The Auto Inn, Marion, Ohio.

FOR SALE—1913 CADILLAC; FULLY
equipped; bought in August; will sell at a sacrifice.
L. H. Velde, Bloomington, Ill.

FOR SALE—1913 SIX-CYLINDER, 45 H. P.
Nyberg touring car, nearly new; three extra tires \$1450 cash. Get photograph. P. O. box 237, Moline, Illinois.

INSTALL AT ONCE BUICK 30, 1913 RUN-
about, 36 H. P., electric lights, extra tire, gray; run under 1,000 miles; first set tires O. K.; cost \$1,225; sell \$900. For particulars address Pearl D. Fife, Unionville, Mo.

LIMOUSINE FOR SALE—GOAT-SKIN
trimmings, French bevel plate glass, electric dome light, two folding seats, windshield. \$1,000 when new. Will sell for \$250. Thom Auto Co., Oshkosh, Wis.

MITCHELLS, REBUILT, GUARANTEED.
These cars are fully equipped. Call or write for further particulars.
Mitchell Automobile Co.,
2334-36-38 Michigan Ave., Chicago.

MOLINE M. 40, 5 PASSENGER, 40 H. P.,
124 in. wheelbase, latest model, perfect condition, gas tank in dash, completely equipped, including unfailing electric starter, 6 electric lights, electric horn, etc. Car is practically new, has been run only 3,200 miles, and has received best of care. Wish to buy Moline-Knight reason for selling. Car cost \$1,950. Will sell for \$1,550 to quick buyer. For further particulars address M. Adamson, Alliwe, Oklahoma.

OLDSMOBILE AUTOCRAT.

Late Model Sixty Horsepower, seven-passenger touring car. A-1 condition, run only about 5,000 miles. Make offers. Also other bargains.

427 East Sixth St.,
Waterloo, Ia.

PACKARD TOURING.

Seven-passenger, completely equipped, just overhauled and repainted; all worn parts replaced; absolutely A-1 condition; has new 1913 fore doors; tires practically new; 2 extra cases; 5 tubes; make an offer. Hoffman Garage, Bedford, Pa.

REAL BARGAIN IN EITHER A FOUR
or six cylinder Thomas. These cars are in prime condition, the latter essentially new. Must sell immediately, price a secondary consideration. Postal brings full details and convincing information. R. S. Patten, 418 Beard Ave., Buffalo, N. Y.

THOMAS MOTOR CAR CO.

SERVICE AND PARTS DEPARTMENT,
1200 Niagara Street, Buffalo, N. Y.

\$750 BUYS 32 H. P. 1913 HUPMOBILE
touring car, fully equipped (like new); a bargain, but be quick.

T. Sherow, Millbrook, N. Y.

Parts and Accessories

FOR SALE

ACCESSORY BARGAINS

WINDSHIELDS

30 CENTS ON THE DOLLAR.

Either straight, zig-zag or rain vision; Also clear vision. Single or double sections. Black, Brass or Nickel.

TOPS.

Brand new Flanders "20" Touring Car tops, made of fine Mohair, complete with Irons, Side and Storm Curtains. Can be made to fit Flanders "20"; Ford and Buick "10" Touring Cars. Also other small four-passenger cars. Price \$11.85.

TOOL BOXES.

Hayes make with lock, black enamel, 18x8x8 1/2. Regular price \$4.50. Our price \$2.15.

BRASS POLISH.

Best made. While it lasts 45c per gallon.

PRESTO TANKS.

Complete and filled with gas.
"A" Large size \$15.00
"B" Medium size 13.00
"E" Small size 11.00

ERWIN GREER & COMPANY

1456-64 Wabash Ave. Chicago, Ill.

Accessory Dept.

A BARGAIN.

Wayne two-wheeled, 50 gallon gasoline tank in good working order. Cheap. Address Box D 572, c/o Motor Age. g

A WRIGHT RADIATOR COOLS THE MO-
tor and gives satisfaction. Built for all cars. We have in stock—

Ford T. and all Buick Models.

Michigan F., 1911. Velle 30, 1909.

Oakland 24, 1911. Parry, 1910.

Hudson 20, 1910-11. Hupmobile, 1910-11.

WRIGHT COOLER AND HOOD CO.,
8th St., Muskegon, Mich.

A \$50.00 AIR COMPRESSOR, \$18.00; FORD
lighting outfit, \$2.90; Ford radiator and hood covers, \$2.75; Clamp on bumpers, \$2.95; Ford master vibrators, \$5.50, 6-80 storage batteries, \$9.50.

FRED ALLEN AUTO SUPPLY CO.,
1610 Michigan Ave., Chicago, Ill.

ACCESSORY CATALOG MAILED ON RE-
quest. Maxwell dealers and owners, we can supply tops, shields, etc., for your cars. Lowest prices, all goods. Write us. Westchester Accessories Co., 1777 Broadway, N. Y. City.

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co., Muskegon, Mich.

ATTENTION, WHITE STEAMER OWNERS!

One Model "M" engine complete; one Model "O" engine complete; one Model "F" and "L" crankshaft complete; generators, burners, axles, wheels, springs and numerous other parts for any model cheap; also one fine straight line, seven-passenger body and one seven-passenger limousine body cheap; one good seven-passenger White Steamer with kerosene burner, \$250; a snap. Address Box D 551, c/o Motor Age. W

AUTO BODIES, WINDSHIELDS, WHEELS.

250 new panel top delivery bodies, some panel top, some open express with flare boards. Will fit three-fourths of autos made. \$28 to \$45. Folding plate glass windshields, \$10 complete. New 32-inch wheels with solid rubber tires, only \$12 each. Benedict Co., 63 Winder St., Detroit, Mich.

AUTOMOBILE PARTS AND MOTORS

Cino Racing Motor, complete with double-spark Remy racing magneto, \$175.00; two-cyl. upright Mitchell engine, \$40.00; 1 D. U. No. 4 Duplex Bosch magneto without coil, \$30.00; 1 two-cyl. opposed 5x5 Davis motor, \$40.00; 1 three-speed selective type transmission, levers, \$40.00; Apple lighting system, \$30.00.

AUTO SALVAGE CO.,
1436 Wabash Ave., Chicago.

AUTO PARTS MAKERS

Repair and service parts for many cars. We own all patterns and parts in stock for Elmore, Warren, DeMott, Welch, Rainier, Marquette, De Luxe and other cars. Complete stock.

Puritan Machine Company,
Detroit, Mich.

AUTO TOPS BUILT AND REPAIRED.

Seat covers and body building, remodeling and trimming. Write for prices.

BITLEY TOP & BODY CO.,
404-410 S. Laflin St., Chicago, Ill.

BARGAINS—BARGAINS—BARGAINS

Is the only thing we handle, from a cotter pin to a complete car. Small and high-powered cars, engines, frames, bodies, axles, radiators, transmissions, magnetos, tops, etc. Before buying let us quote.

Pacific Motor Car Exchange Company,
10 West 62nd St., New York.

AUCTION! AUCTION!

MICHIGAN BUGGY CO. SOLD.
WRITE FOR COMPLETE LIST
BUT DON'T OVERLOOK THE FOLLOW-
ING BARGAINS FOR 10 DAYS ONLY.

100 34x4 Firestone demountable rim wheels with rims, per set (4)....\$20.00
100 34x4 wheels Q. D. rims, set (4).... 7.00
20 Shaft drive rear axles, I beam front with hubs for 3,000 lb. car, set.. 40.00
34 Set tire brackets, rear..... 2.00
25 Jones speedometers with clock, nickel 25.00
40 Jones speedometers 10.00
4 Autolighter generators 50.00
273 Electric tall lamps with bulb..... 1.25
9 Sandusky 4-cylinder motors, 40 H. P. with magneto..... 98.00
31 Buda 4-cylinder, 40 H. P. motors with magnetos 125.00
28 Cone clutches for above motors... 20.00
31 Pressed steel Michigan frames to fit above motors..... 10.00
31 Michigan bodies fore-door latest model to fit frames, not upholstered 25.00
2 Finished bodies (gray) with fenders, hood, mud aprons and running board box 100.00
2 Brown bodies same as above..... 105.00
10 K-W high-tension magnetos..... 30.00
10 Briggs 6-cylinder magnetos and coil 18.00
25 Atwater-Kent 4-cylinder Unisparkers 19.00
6 Pressed steel frames for 6-cylinder motors 10.00
500 ft. 1 1/2" radiator hose, per foot... .15
500 ft. 2" radiator hose, per foot..... .18
10 Midland 5-passenger bodies, latest type, not upholstered..... 25.00

MIGHTY MICHIGAN 40 CAR OWNER,
WE CAN SUPPLY REPAIR PARTS FOR
YOUR CAR.

Rear axle shaft and flange, each.. \$ 5.00
Rear wheels with hub and drum, each 10.00
Front wheels with hub, each..... 8.00
Differential with ring gear..... 25.00
Rear axle housing..... 15.00
I-beam front axle complete..... 25.00
L. H. drive steering gears..... 15.00
30 3/4 scroll 2x44" springs, each..... 3.50
30 Half elliptic 2x36 1/2" 6-leaf springs, each 2.50

AUTO PARTS CO.,
737-739 Jackson Blvd.,
CHICAGO.

BARGAINS.

30 H. P. Chassis (new not 2nd hand) for delivery or pleasure bodies....\$ 495.00

G. J. G. Racing Machine, 70 M. P. H. (new not 2nd hand) 1,250.00

G. J. G. Special Racing Machine, 90 M. P. H. (used 100 miles) 3,500.00

Also have motors, radiators, steering gears, transmissions, front and rear axles with wheels, pressed steel steps, heat treated steel frames, large and small.

All of above new and not used or 2nd hand.

G. J. G. MOTOR CAR COMPANY,

White Plains, N. Y.

BALL & ROLLER BEARINGS

All Types and sizes.
We also repair or exchange all makes of ball bearings.

THE GWILMANT CO., 253 W. 58th St., N. Y.;
1314 Arch St., Philadelphia.

BERGDOLL REPAIR PARTS

The repair business of the Bergdoll cars, together with all drawings, jigs, patterns, etc., has been purchased by us. We have a complete stock of repair parts for all models on hand and orders for parts for Bergdoll cars should be placed with us direct to save time.

Louis J. Bergdoll Motor Co.,
124 N. 3rd St., Philadelphia.

BIG MONEY VULCANIZING AT HOME.

Easy learned. Book 50c.
VANDERPOOL'S, SPRINGFIELD, O.

COMPLETE "VULCAN PROCESS"

of oxy-acetylene welding
plants from \$175 for the blacksmith and garage plant up to largest made. Torchlight weight. No backfiring in ordinary work.

Write today for our booklet on welding.
Vulcan Process Co.,
25th and University Ave., S. E.,
Minneapolis, Minn.

COUPE AND SEDAN BODIES.

Prompt Delivery.

Handsome, new bodies, latest ideas of design. Built for 1914 models. Can be fitted to nearly any car.

An exceptional opportunity to get a ready-built, up-to-date coupe or sedan at the season when they are most in demand.

Write at once, giving name of car and model for which body is wanted.

Paul Murray, Dealer in Automobile Bodies,
518 Ind. Trust Bldg., Indianapolis, Ind.

CUT-OUTS.

E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock open pedal. \$1.50.
Lincoln Machine Shop, Lincoln, Ill.

DOES YOUR MOHAIR AND CANVAS TOP leak? Coleman's Waterproof Filler will make it rainproof. It will not stiffen or change the color. Virginia Waterproofing Corp., Arcade Bldg., Norfolk, Va.

DRAGON REPAIR PARTS

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

FORD BODIES.

Brand new 1914 Ford Touring Bodies...\$100.00
Brand new 1914 Ford Torpedo Bodies. 55.00
Brand new Panel Ford Delivery Bodies 135.00
Touring and Torpedo Bodies are complete with top, but without windshield. If shield is desired, \$8.50 extra.

ERWIN GREER & COMPANY,

1456-64 Wabash Ave.,
Chicago.

FORD, HUPP AND MAXWELL
Muffler cut-out, machined ready to attach, including lock open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill. o

FORD LIGHTING OUTFITS, \$5.50
Includes parabolic reflectors, tungsten bulbs, wiring switch and free delivery. Truscott Auto Supply Co., St. Joseph, Mich.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.
Ford Parts Specialty Co.,
1211 Main St., Richmond, Ind.

FORD OWNERS.

Atlas Valve Remover, specially designed for Ford Cars. Send \$1.00, we ship Parcel Post. Atlas Machine Co., Providence, R. I. b

FORD OWNERS, OUR PURE WHITE FELT
washers for Ford rear axles, stop grease leak. 20c set four, prepaid. Angier's, Streator, Ill.

FORD OWNERS—WE CAN MAKE YOUR
car the easiest rider made with light or heavy load; no jolt, no jars, no upthow. Write us. Thomas Auxiliary Spring Co., Canisteo, N. Y.

FORD OWNERS—OUR SPARE DEMOUNT-
able wheel cures tire trouble on road. Doctors, attention. Write Angier's, Streator, Ill.

FORD T. OWNERS.

Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill. c

FORE DOORS

We are prepared to make prompt shipment from stock and guarantee the doors to fit or money returned.

F. E. LORTZ CO.,
1547 So. Michigan Ave., Chicago, Ill.

FORE-DOORS AT CUT PRICES

Mr. Auto Owner and Dealer: If your car is without fore-doors, write today for bargain prices; to reduce stock.

DEPT. D. AUTO SPECIALTY MFG. CO.,
326-30 E. Market St.,
Indianapolis, Ind.

FOR SALE.

Ford Taxicab Body. No. 1 condition.
E. B. Collins Motor Co.,
Danville, Ill.

FOR SALE AT A BARGAIN—NEW 5x6
four-cylinder, governor-controlled engine, fully equipped with carburetor magneto. Will sell for much less than cost.
Hackney Mfg. Co.,
570 Prior Ave., St. Paul, Minn.

FOR SALE—BOSCH COIL
new D U 4-type "A" horizontal; \$20.00 takes it. Franklin D. Rice, 335 Cincinnati St., Dayton, Ohio.

FOR SALE CHEAP, ONE 60 H. P., 4-CYL-
inder Imperial Motor, almost new, including transmission, \$175.00. Leslie James, Richland Center, Wis.

FOR SALE — ONE SCHEMEL OXY-
acetylene plant; will sell at a big bargain.
W. H. Werbe,
Kokomo, Ind.

FOR THE PROTECTION OF FORDS.

Mr. Ford Owner, it will cost you just \$1.50 to absolutely insure your car against theft. The Kimball Safety Noiseless Crank-Holder and Lock holds the crank rigidly in place, securely locked. Figure the cost of the Kimball against a theft insurance policy. Made of spring steel, neatly enameled, it adds to the appearance of your car.

IT STOPS RATTLING OF CRANK HANDLE
Easily applied in five minutes requiring no alterations in car.

For sale at Ford agencies and garages, or sent prepaid—including lock—on receipt of \$1.50.

Responsible Dealers Wanted.

NORTHERN SPECIALTY CO.,
Crystal Falls, Mich.

FOR SALE—ONE \$175.00 BOWSER GASOLINE outfit. Brand new. Will sell at a bargain.

RANDALL MOTOR CAR CO.,
Fort Wayne, Ind.

FOR SALE—1911 MODEL LIMOUSINE
Body for Pierce Arrow Model "48." In perfect condition; never been used but once and then for just one week. Can be had for \$975.00; original cost \$2,250.00. A Big Bargain.

Queen City Motor Co., Beaumont, Texas.

GUARANTEED RADIATORS.

Not always necessary to buy new radiators. New cores can be furnished for frozen or damaged radiators. We build the fin and tube type. Guaranteed copper fins and tube.

Ford Model T core	\$14.00
Ford R. S. & M.	23.00
Hupmobile 20	23.00
Hupmobile 32	30.00
Warren 30	25.00
Warren 40	30.00
E. M. F., Patterson, Cole 30	30.00
Flanders 20, Paige 1912	25.00
Buick 10, 14, 32 and 33	25.00
Buick 16, 17, 18, 19, 21, 26, 27	30.00
Hudson 20	25.00
Hudson 33, Cadillac 30	30.00
Paige 1910, 1911	23.00

The above is the price of cores only. Where casings are damaged beyond repair, add \$5.00.

All our work guaranteed absolutely new-built to your order. Do not be misled, cores cannot be rebuilt. Write for price on radiators not mentioned in above list.

HURON RADIATOR & LAMP COMPANY,
253-255 Jefferson Avenue,
Detroit, Mich.

Terms: Cash with the order.

INSTALL A DIM-A-LIGHT.

Reduces headlights 25% by simply turning switch.

Pellets Magneto Exchange.
1463 Michigan Avenue, Chicago, Illinois.

"JIFFY" SIDE CURTAINS FOR FORD cars. Everything complete ready to attach to bows. Touring \$15; Roadster \$12.50. Price-list curtains for all cars on request.

HERCULES RUBBER CO.,
"Jiffy" Curtains Division,
No. 2 Hudson St., New York.

LION REPAIR PARTS.

We have on hand a complete stock of repair parts for all models of Lion Cars.

Lion Motor Parts Co.,
124 N. 3rd St., Philadelphia, Pa.

MAGNETOS: WE HAVE 2,000 MODEL X Splitdorf Magnets, new. Price, without coil, \$17.50 each; with coil, \$25.00 each. The regular price of these is \$75.00.

We also have other makes of magnetos at cut prices—in fact, everything for the automobile. Send for "OUR PRICE WRECKER"—the greatest money saver in the world.

TIMES SQUARE AUTO CO.
1210 Michigan Blvd., Chicago, Ill.
S. W. cor. 56th St. & Broadway, N. Y. City.

MAKE IT BY THE GALLON CHEAP. Silver plating fluid for brass. Simply apply with soft cloth. Formula for dollar bill. W. H. Hegeman, Northwood, Iowa.

MORA REPAIR PARTS

We purchased the repair business of the Mora Company and have in stock repair parts for all models of Mora cars.

Philadelphia Machine Works,
67 Laurel St., Philadelphia, Pa.

MR. (FORD) OWNER AND GARAGE MAN. The Townsan Valve Adjuster has a cushion for your valve-stems. Takes away the click, absolutely silencing the valves. No screws or burrs to work loose. Saves putting in new push-rods and valve-stems. They never wear out. Price \$1.50 by mail. Ask your jobber, or address Townsan Auto Specialty Co., Mitchell, S. D.

NEW FORD TOURING CAR BODY WITH top and side curtains, complete, painted and upholstered, crated, f. o. b. Toledo, \$68.00. MacInnis Bros., Toledo, Ohio.

PEERLESS LEATHER TOP DRESSING. A preserver for all rubber, leather and fantasote tops and curtains. Makes old tops like new. Ask your dealer.

The Columbus Varnish Co.,
Columbus, O.

PAINT YOUR CAR YOURSELF

Save \$25 to \$75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

ARSENAL VARNISH COMPANY
Auto Dept., Rock Island, Ill.

PEERLESS CUSHION DRESSING
Brightens and renewes all leather seats and cushions. Will not wash or rub off. Dries in twenty minutes. Ask your dealer.

The Columbus Varnish Co.,
Columbus, Ohio.

PRACTICAL VALVE GRINDER AND bearing scraper combined. Guaranteed to seat any valve in two minutes. A perfect bearing assured. With valuable working data by an automobile expert. Price 50c. Master Mechanic, Dept. B, Box 528, Oak-land, Cal.

PEERLESS LAMP ENAMEL.

A black enameled lamp with one coat. Not affected by heat or cold. Does not crack, chip or peel. Made in either a Gloss or Dull Finish. Ask your dealer.

The Columbus Varnish Co., Columbus, Ohio.

PUT UP A GOOD FRONT.

The Detroit Radiator is guaranteed to give satisfaction. It insures perfect cooling, won't break through freezing, and is the strongest and best radiator for replacement purposes.

Stock Radiators.

Ford T (special construction)	\$20.00
Ford T (honeycomb with larger cooling area)	30.00
Buick 10-32-33	26.00
Buick 16-17-19-26-27	31.00
Buick 24-25	35.00
Overland	30.00
Chalmers 30-40	30.00
Hudson 20	30.00

Prompt delivery on special radiators.

DETROIT RADIATOR & SPECIALTY CO.
963 Woodward Ave.,
Detroit, Mich.

PEERLESS LINING DYE

Makes all faded, stained and spotted linings a black uniform color. Makes old linings like new. Ask your dealer.

The Columbus Varnish Co.,
Columbus, Ohio.

RADIATOR COVERS FOR ALL CARS. Every car should have a radiator cover in cold weather.

Write for prices.

Auto Cape Top Co.,
2334 Michigan Ave., Chicago, Ill.

PEERLESS MOHAIR TOP DRESSING
Waterproofs leaking tops and makes old tops like new. Sold by garages, dealers and jobbers.

The Columbus Varnish Co.,
Columbus, Ohio.

RADIATORS

Every radiator guaranteed absolutely new, not a reconstructed one.

In stock for immediate shipment.

Ford Model "T"	\$18.00
Buick 10-14	27.50
Buick F-16-17-19-26-27-28	35.00
Hudson 20	33.00
Chalmers F-40	30.00
Huppm 32	25.00
E-M-F 30	30.00
Anhut	15.00
Northern C	32.00
Wayne 30	35.00
Special 40 H. P.	15.00
5% discount allowed for cash with order, otherwise one-third cash with order, balance C. O. D.	

We also have all repairs for the Wayne, Queen and Northern cars.

AUTOPARTS MANUFACTURING COMPANY

453 Trombly Avenue, Detroit, Mich.

RADIATOR COVERS

Full stock for all cars
Prompt shipment
Ford covers, \$1.40; other cars, \$2.50.
Send for my tire price list.
ALLEN S. SINSHEIMER
1505 Michigan Ave., Chicago

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T	\$16
Buick, Model 10	22
Buick, Model F	25
Chalmers-Detroit	20
Everett	20
Stoddard-Dayton	25

Any other make required at equally low prices.

The Times Square Automobile Co.,
1210-1212 Michigan Ave., Chicago.

RIMS, RINGS AND RIM PARTS FOR ALL

rims made. Send for our rim part catalogue.

KASTNER TIRE AND RIM CO.
2101 Michigan Ave.,
Chicago, Ill.

SAVE GASOLINE—PREVENT BACK-FIRE.

An absolute necessity to every owner. Economizes fuel, saves from 25 to 50% on your gas bill. 100% efficiency guaranteed. Don't delay, write us at once. This device sells for \$5.00. Thirty days' trial; if not as represented, money refunded.

GAS SAVING & BACK-FIRE PREVENTER CO.
125 E. 23rd St., New York, N. Y.

"SAVE YOUR GASOLINE."

We have 150 Rayfield carburetors, regular \$20.00 kind. Our price, \$8.20 while they last.

PURITAN MACHINE CO.
415 Lafayette Blvd., Detroit, Mich.

SCHEBLER MODEL "L" CARBURETORS,
new, 1 1/2-inch, \$8.00 each. Order early.
Kent Motor Car Co., Kenosha, Wis.

SEAT COVERS OF QUALITY.

FORDS—OVERLANDS—STUDEBAKERS

Our prices and samples will surprise you.
Send for them today.

GLOBE SEAT COVER CO.,
Dept. M, Racine, Wisconsin.

SHINAUTO—THE GREAT PRESERVER.

Keeps auto like new without washing. Prevents cracking and checking of varnish. Makes old cars like new. Guaranteed. Saves paint bills. Trial can, 50c by mail. Enough for two months' treatment.

SHINAUTO MFG. CO., INC.
1137-1139 No. Illinois St., Indianapolis, Ind.

SPECIAL BARGAINS.

Warner transmissions, new, 3 speed selective, \$50.00 each. Warner transmissions, new, 4 speed, selective, \$70.00 each. Honeycomb radiators, 30-50 H. P., \$25.00 each.

Fans, \$2.00 each. Auxiliary seats un-upholstered, \$8.50 per pair.

Splitdorf magnetos, 4 cylinder, new, \$16.00.

Splitdorf spark plugs, 1/2, 60c each.

Rutenber motors, model 27, 4 cylinder, 3 1/2 x 5 1/4, complete with fan, starting crank, magneto, coil, price \$200.00.

AUTOMOBILE APPLIANCE CO.

1714 Michigan Ave., Chicago, Ill.

STOP THAT LEAK IN YOUR RADIATOR
with one ounce of Overton's Radiator Leak Compound. A pound can by parcel post for 35c cash. N. L. Overton, 1109 4th Ave., Council Bluffs, Iowa.

THAT MYSTERIOUS RAG

For dusting and polishing automobile bodies, windshields, lamps, pianos or any other polished surface. Will sell on sight, good proposition for garages. Sent to any address upon receipt of 50c.

THE GEM SUPPLY,
1036 So. Main St., Waterbury, Conn.

TOPS BUILT, RECOVERED AND RE-paired. Also Top Covers, Radiator Covers, Luggage Cases, Celluloid, etc. C. G. Meyer & Son, Tiffin, Ohio.

TOPS, NEW OR RECOVERED; CUSHIONS and Backs, new or recovered; Carpet Rugs; Curtains; Dust Covers, etc. W. H. Newton & Son, 120 Elm St., Cortland, N. Y.

TOURING ROADSTER, RACING BODIES.
Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.

Auto Sheet Metal Works,
1534 Michigan Ave., Chicago.

TRUFFAULT-HARTFORD SHOCK ABSORBERS: \$45.00 kind; \$20.00 set of four.
PURITAN MACHINE CO.,
417 Lafayette Blvd., Detroit, Mich.

UNION OXY CARBIDE CO.
Manufacturers of Portable (weight 40 lbs.) and stationary welding, cutting or lighting plants; supplies of all kinds. Agents wanted. Fulton & Enfield Sts., Brooklyn, N. Y.

WELDING PLANT, CUTTING PLANT,
Carbon Removing Outfit, or a combination of all of these at from \$15.00 to \$175.00 for high or low pressure system. For full particulars address Bermo Welding Apparatus Co., Omaha, Neb.

WE MAKE FORD RACING TYPE BODIES
in several models for immediate delivery.
Auto Sheet Metal Works,
1532 Michigan Ave., Chicago, Ill.

WE NOW HAVE BUT A FEW 30-35 AND 35-40 H. P. MOTORS ready for shipment. Complete with magneto, coil and clutch. F. E. Alford, Goshen, Ind.

WESTON MOTT HIGH GRADE REAR AXLES, \$45.00. Other bargains, too.
PURITAN MACHINE CO.,
413 Lafayette Blvd., Detroit, Mich.

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2-CYLINDER OPPOSED MOTOR, 14 H. P., set wheels, 34x3 inch, with tires; Olds rear axle; 1 Friction Trans., one set springs, half and $\frac{3}{4}$ scroll Krit radiator. Peter De Cloux, 110 Bryeau Ave., Oconto, Wis.

50 NEW PRESSED STEEL FRAMES, 163" long, 34" wide. Each, \$10.00.
Send for sketch.
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7-PASSENGER BODY, TOP, AND WINDSHIELD complete, new, for 1913 Chalmers "Six," \$350.00; 7-passenger body for 1910 Winton "Six," good shape, \$100.00; 1911 Cadillac 5-passenger, newly painted, fine shape, \$675.00. M. H. Wood & Co., Webb City, Mo.

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COMPLETE SET OF LAMPS
5 LAMPS, BLACK AND NICKEL FINISH
Two Head, 2 Side, 1 tail, all for \$9.95.
Gas Headlights short-coupled type, ground mirror and nickel front reflector.
Door 10", lengths 6 $\frac{1}{2}$ " to fit 8" brackets.
Oil Side Lamps, semaphore lens.

Body lined, height 9 $\frac{1}{2}$ ".
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ALL BLACK AND NICKEL FINISHED.
Victor set of 5 lamps.....\$9.95
Victor Gas Head Lights only, pair.....6.80
Victor Oil Side Lights only, pair.....3.85
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Experienced motor designer has complete detail drawings and patterns for 2 cylinder 12 H. P. air-cooled motor designed for cyclecar use, also model. This motor can be contracted out and built for less than \$30. Desire correspondence with interested parties. Anonymous replies rejected. Address Box D 568, c/o Motor Age.

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Springs and transmissions

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30x3	7.65	1.98	1.90
32x3	7.80	2.05	1.95
30x3 1/2	11.00	2.70	2.60
32x3 1/2	12.00	2.90	2.65
32x4	15.70	3.60	2.80
33x4	16.00	3.70	2.85
34x4	17.25	3.80	2.90
35x4	17.50	3.90	2.95

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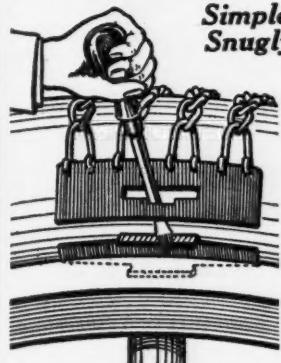


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Simple and Easy to Install. Fits Snugly on a Level with the Tread
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3 1/2 inch	\$2.00
4 inch	2.25
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5 inch	2.50
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**SILVER
EDGES**
on

Raybestos REG. U.S. PAT. OFF.

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

The Standard Asbestos Brake Lining

An important change has been made in the marking of Raybestos—the original and standard asbestos brake lining.

To Prevent Substitution and
Protect the Buyer

—Commencing December 1st, every foot of Raybestos that leaves our factory will not only have the name "Raybestos" stamped upon it—but will have bright silver edges.

This step has become necessary to protect buyers of brake lining and insure their getting the genuine Raybestos, and prevent the substitution that is being imposed upon the car owner.

The Silver Edge that Signifies
Quality and Safety

There are many imitations of Raybestos which closely resemble it in outside appearance, but which do not grip and hold with the same tenacity or prove nearly as durable as Raybestos, which is always dependable.

Look for the name Raybestos and the silver edges on every foot of this superior brake lining which does not fray, peel, ravel or disintegrate in use.



—INSIST ON GETTING
RAYBESTOS—

The Royal Equipment Co.
1352 Bostwick Ave. Bridgeport, Conn.
Makers of "Duplex" and "Raymond" Brakes

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DUELEC

15 mils

As Necessary as Spark Plugs

One turn and off she goes. Hot, vaporized gasoline right into the intake manifold.

Better than a dozen ordinary primers combined.

Saves your starter (if you have one) \$50 worth of wear and tear a season. Absolutely insures immediate starting on crank in any temperature.

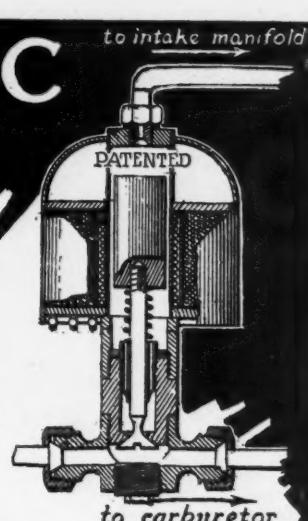
Sure to be universally used. Works automatically with your starter, or when cranking.

MR. MOTORIST—Demand it from your dealer. Or sent upon receipt of \$10.00.

DEALERS—This is one big sales proposition for you to investigate.

To the Manufacturer—Be a leader and include the DUELEC as part of your standard equipment.

This device is an important for starting as oil is for the engine—takes only an hour to install. Write for information and make checks to



U. S. TRAUB

14 North Broadway. Yonkers, N. Y.

47M

DOVER

Garage Specialties

DOVER STAMPING and MFG. CO.
CAMBRIDGE-MASS.



Dealers, write for our complete catalogue of garage accessories

DOVER STAMPING & MFG. CO.
CAMBRIDGE, MASS.



IN WEATHER
LIKE THIS

You'll Appreciate Your

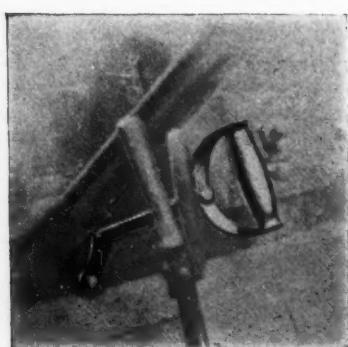
BOSTON STARTER

Cranking will be robbed of all its terrors this coming winter if your FORD CAR is equipped with a BOSTON STARTER. What a relief it will be to get into the seat—pull the handle of your BOSTON STARTER—and instantly hear the welcome response of the motor!

The BOSTON STARTER is purely a mechanical device; it has all the power of acetylene or electric starters **without** their annoyance and expense; there is nothing to get out of order; its parts are few, simple, and strong. The entire device is beneath the hood, except the handle, which is located on the dash.

The BOSTON STARTER was designed particularly for your FORD CAR and is just the thing to make it even **more convenient, more useful, and more easily operated.**

See the BOSTON STARTER at our nearest representative's or write for literature.



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172 Columbus Avenue

Boston, Mass.

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COMPANY,
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On the Way to Two Million

THE demand for Bosch Magnetos is such that within a remarkably few years it has been necessary to greatly increase manufacturing schedules. The Bosch factories are well on the way to supplying the two millionth magneto.

Even more remarkable is the fact that of all these magnetos, not one has been, in any sense of the word, a failure.

The Bosch Magneto

remains the one perfectly reliable ignition source, and as such it is universally recognized.

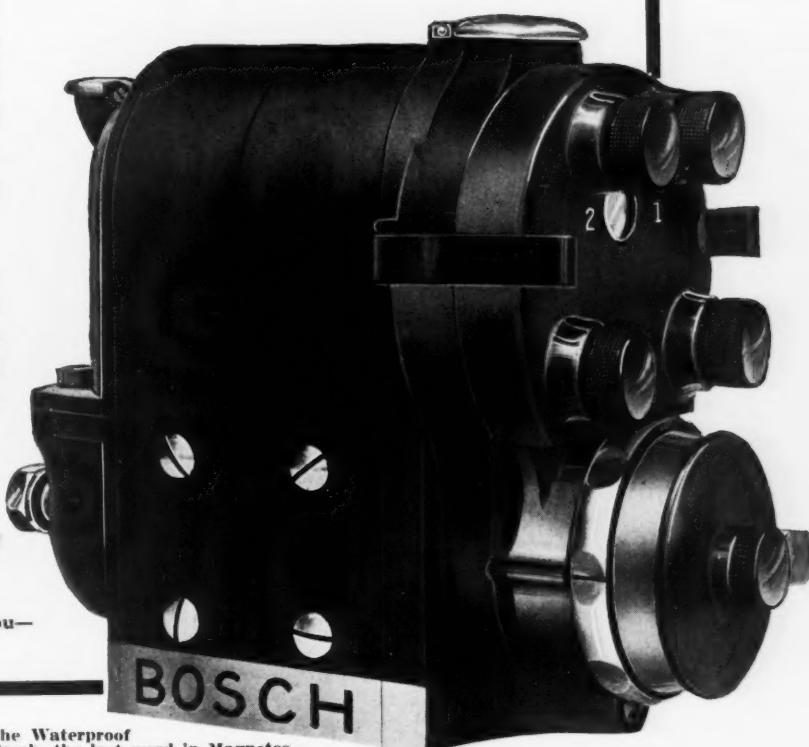
It is so well made, so carefully designed, that its regularity can be depended upon under all conditions. You always will have confidence when your engine is Bosch-Equipt—magneto and plugs.

If your present engine is not Bosch-Equipt tell us the car or engine you use, and we will recommend the magneto most suitable for it, and send you literature describing the magneto in detail.

Why not be among the
Two Million Satisfied

Bosch Magneto Company
214 W. 46th St., New York

—Over 100 Service Stations to Help You—



The Waterproof
Bosch, the last word in Magnetos

Jackson

*No Hill Too Steep,
No Sand Too Deep*

Three Great Models Take the Heart Out of Competition

YOU can not find a better line for 1914 than the Jackson line. It offers splendid possibilities for responsible dealers.

With the three Jacksons—"Olympic Forty" at \$1385, "Majestic" at \$1885 and "Sultanic Six" at \$2150—you can meet every demand, from that of the buyer whose chief consideration is economy plus satisfaction to that of the buyer who wants the utmost in luxury, power and style without paying too much for it.

The dealer fortunate enough to control the Jackson agency in his territory has many advantages. On the simple basis of comparison with all other makes in the same price class, Jackson models are at least on an *even* basis as regards specifications. In *quantity* you have as much to offer as your competitors. IN ADDITION, you can give your buyers *qualities* that competing cars do not possess.

First: The culmination of eleven years' experience and knowledge; in short, of superior mechanical excellence.

Second: The permanence and responsibility of the Jackson Organization gained by eleven years of successful manufacturing.

Third: The financial stability of the Jackson Company guarantees its permanence.

Fourth: Jackson manufacturing facilities are not surpassed. The efficiency of the Jackson factory guarantees prompt deliveries of a uniformly standard product.

Fifth: Jackson service is a dealer-advantage that cannot be figured in dollars and cents, but present Jackson dealers know that the Jackson service policy has helped them sell many cars to friends of Jackson owners.

Sixth: Advertising is a feature no dealer should overlook. Jackson advertising has become a recognized part of our development and success, by its steady persistence.

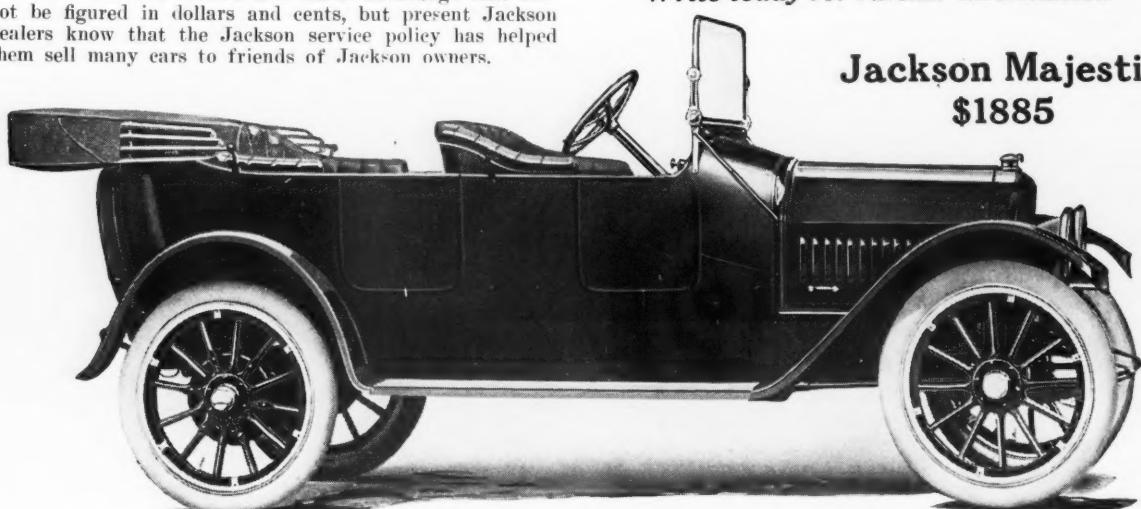
Seventh: Greater even than this paid advertising is the reputation and prestige-building advertising of old Jackson owners all over the country. Jackson dealers have the cumulative value of eleven years of satisfied ownership working with them.

Sum all these features up and add to them a car that is intrinsically worth every cent asked for it and you have a business-building, profit-making proposition.

Quick sales and sure profit for the Jackson dealer—that's the story in a nutshell. For the Jackson is attracting buyers by its big value, and making satisfied customers by its real quality and durability. You can build up a permanent and paying business on such a line.

Write today for further information

**Jackson Majestic
\$1885**



Jackson Automobile Company, 1207 E. Main St., Jackson, Mich.